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Resources Conference

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and Economic Goals*

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The Wildlife Management Institute expresses its appreciation to The Wildlife Society and the many organizations and individuals who contributed to the success of the Thirty-ninth North American Wildlife and Natural Resources Conference.



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**PART I**  
**Opening General Session**





# GENERAL SESSION

Monday Morning—April 1

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## **New Planning and Management Approaches for Natural Resources**

*Chairman:*

GILBERT F. WHITE

Professor, University of Colorado, Boulder

*Vice Chairman:*

VIRLIS FISCHER

Las Vegas, Nevada

## **Formal Opening—Thirty-ninth North American Wildlife and Natural Resources Conference**

**Daniel A. Poole**

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

Welcome to the 39th North American Wildlife and Natural Resources Conference.

In historical perspective, the past thirty-eight Conferences and the preceding twenty-one American Game Conferences chart the evolution of the Wildlife Conservation Movement in North America. Yet surprisingly, some people question the direction of this meeting. They point to papers on water pollution, water resources development, energy, drainage, channelization and agriculture, forestry and public lands management, coastal and inland land use planning, and on human population. What do these subjects have to do with fish and wildlife, they ask?

If only fish and wildlife could live in such splendid isolation! If only fish and wildlife did not have to share land and water with man. Too many of our fellow citizens fail to realize that the future of fish and wildlife depends as much, if not more, on understanding the social, behavioral, and economic habits of man as it does on knowing the habits of the animals. The abundance and diversity of wildlife are a measure of environmental quality, a condition beneficial to man. And it is man who abuses the environment, and therefore impacts wildlife, on nearly every hand.

For wildlife, this is a time of oversimplification. A time of easy answers and subsidized environmental abuse. Call for enactment of another law. Propose another program. Ridicule professional resources management. Question the motives of those involved.

What one sees and hears today remarkably resembles the sincere but largely disproven efforts made to protect America's wildlife in the early days of this century. If we permit this tide of simplification to overwhelm us, if we passively submit to it, instead of standing for what we know to be correct, America's wildlife will be harmed apace.

There are those who say our critics do not understand us. Yet we may not fully understand ourselves. There are others who suggest that our critics should be mollified by recitation of our past good deeds. But this is not the past. We are dealing with the problems of today and tomorrow.

We may not be able to respond fully to the demands and challenges that lie ahead. Society sometimes prevents us from responding. Elected and appointed officials will not lead, legislative bodies will not act, and the public balks or is disinterested.

But does all the blame for wildlife's problems rest elsewhere? I think not. We, too, have acquiesced to oversimplification. We, too, have accepted what we do without sufficient analysis of its value. We, too, have not exposed weaknesses and worked for their reform. We, too, have been reluctant to accept the fact that misjudgment in a single agency may discredit all of us across the board.

Is there anyone who is seriously concerned about wildlife who will say he is satisfied with the federal accelerated wetlands acquisition program, now thirteen years from takeoff and only two from touchdown and required payback from Duck Stamp receipts?

Is anyone prepared to argue that the original acreage goals were correct and remain correct today? Is there a man among us prepared to argue that the program offers the best method of protecting wetlands? Is anyone, in fact, prepared to say that the current waterfowl management program is adequate for all species?

Can anyone claim without serious challenge that the Federal Government, in any Administration for the past two decades, has responded to the desperate plight of the national wildlife refuge system? Are we shooting square with the public if we remain silent on this problem?

Is there a man among us satisfied with the relationship between the Department of the Interior, which houses the agency having primary federal responsibility for fish and wildlife, and the Department of Agriculture whose agencies manage millions of acres and influence land and water use on most of the nation's farms and ranches? With farm and ranch land habitat so vital to fish and wildlife and recreational opportunities, why is there not vastly better contact with agricultural interests at all levels?

Is anyone satisfied with the way the Agriculture Department is bobbling the wildlife conservation mandates written into Title X of the Agriculture and Consumer Protection Act of 1973? How is our wildlife interest responding to USDA on the federal level?

Should we be satisfied with the mix of fish and wildlife biologists on the staffs of the Bureau of Land Management, Forest Service, or the Soil Conservation Service? These agencies control or influence wildlife habitat on vast acreages of

public and private land. Are you satisfied that the biologists' recommendations receive consideration in the planning, design, and implementation of programs? Should we be satisfied with the few dollars available for their work?

Much more can and should be done to benefit wildlife through already authorized programs. Much could be accomplished by greater use of laws already on the books, but full funding seldom is requested or granted, staffing often is inadequate and authorities are applied only in part, at best. Conservationists should insist that Congress and the Executive live up to the law.

Few members of Congress really are interested in wildlife in other than a superficial way. It is virtually impossible to convince a committee chairman that he should spend several days holding oversight hearings on a deserving subject. How else can weaknesses and discrepancies be brought to the fore if our profession refuses to pinpoint them and demand their correction by Congress? As habitat is diminished—and it is being diminished—the wildlife manager, his agency, and our profession ultimately come under fire, not elected and appointed officials.

We must have stronger federal wildlife capability, a capability that deals more with habitat accountability throughout Government than it does with custodianship of animals. We also need much stronger ties between federal and state levels and among the states themselves.

I commend the International Association of Game, Fish and Conservation Commissioners for the progress it is making in state and state-federal coordination. But much, much more must be done by all of us.

Unfortunately, the leadership and the programs of most state wildlife agencies are unknown to Senators and Representatives in Congress. Too many times, state agencies are treated as adversaries by the very men who should help them. This serious weakness arises, at least in part, from the state agencies' apparent failure to recognize that Congress judges their overall effectiveness not by the programs that are strong but rather by those that are weak.

On the national level, many pending issues involve wildlife and their habitat. There is the Administration's proposal to create a Department of Energy and Natural Resources, a super agency that would fracture many old ties and associations. If there ultimately is to be change, as some congressional leaders insist, what can be done to channel reorganization in favor of fish and wildlife and ecologically sound use of our resource base?

A special panel is proposing substantial realignment of the House committee structure. Some knowledgeable and understanding committee chairmen and members would be swept away, to reappear no one knows where. Done one way, reorganization would lump wildlife with energy, an unnatural alliance that several states discarded decades ago. Done another way, it could favor preservation over scientific management. Where do wildlife leaders stand on this?

Congressional hearings are expected soon on proposals to improve the Federal Fish and Wildlife Coordination Act, in theory toothy, but in practice a toothless law which seeks some bite for fish and wildlife in water resources developments. Improvements in the Act grow out of recommendations of the National Coordinating Committee on fish and wildlife in federal water resources projects. And these recommendations are bolstered by a recent General Accounting Office Report that fish and wildlife are not receiving equal consideration with other resources in water development projects.

I hope that the state fish and wildlife agencies and the State Governors will support these necessary amendments. I hope each state enacts the model State Fish and Wildlife Coordination Act that is in the Council of State Governments' 1974 roster of suggested state legislation.

You can help punch this over. If you do not participate, a once-in-a-decade opportunity to benefit fish, wildlife and other resources may be lost.

How many more Cache River Projects and Garrison Diversions are fish and wildlife conservationists going to sit still for? Why cannot federal water resource planning involve fish, wildlife and other resources from the very beginning? The Fish and Wildlife Coordination Act says this must be done, but the law is not being everywhere observed by either development agencies or the federal fish and wildlife agency.

If you think that our interest is destined to be run over forever by water development, then take a look at Section 73 of the Water Resources Development Act and Title X of the Agriculture and Consumer Protection Act, both of 1973. Nonstructural alternatives to flood protection are authorized in each. The Water Resources Development Act directs that "In the survey, planning, or design by *any* federal agency of *any* project involving flood protection . . ." consideration shall be given to nonstructural alternatives. Acquisition of flood plains for recreation, fish and wildlife, and other public purposes is mentioned specifically. And in the Farm Act, the Secretary of Agriculture is authorized to purchase perpetual easements to promote the sound use and management of flood plains, shore lands, and other aquatic areas.

Other bills pending in Congress also deal with the basics of our business. One, passed by the House and now before the Senate Committee on Commerce, would expand the wildlife conservation program on military lands, an area nearly equal to that of all the national parks. It also would authorize the imposition of a fee where states willingly enter into agreements for improving terrestrial and aquatic habitat on designated public lands.

A pair of Senate and House bills would raise more money for wildlife conservation by imposing a manufacturers' excise tax on the component parts of handloaded ammunition. This source could yield upwards of several million dollars annually, if taxed comparably with sporting firearms and ammunition, handguns, and archery items, which already support wildlife conservation. Like the handgun and archery tax receipts, part of the income would be used for hunter education and public shooting ranges. With attention from many here, this sound bill could be enacted this year.

Some states appear to be dragging their feet on hunter education. In my opinion, the individual or the agency that ignores this essential undertaking will do serious disservice to wildlife and to hunting in the long term.

Now, a final note. In the last two years, tremendous effort was expended by agencies, organizations, and conservationists in helping Congress correctly decide national wildlife policy. This was done through the Marine Mammal and Endangered Species Acts. In both, Congress firmly established that this country's wildlife are to be managed on a scientific basis.

I know that the two new programs are not sound in all aspects, but do not lose sight of the fact that, despite tremendous preservationist pressures, Congress opted for scientific wildlife management. Had Congress not done so, the present situation would be chaotic rather than merely aggravating.

The Bureau of Sport Fisheries and Wildlife has yet to inform states about the kind of assenting Act that will be required for compliance with the Endangered Species Act. In fairness, it must be recognized that the Bureau also finds difficulty in responding to the Act's unrealistic and impossible time schedule. Because of the lateness of Congress' approval of the Act last year, and the necessity for affirmative action by state legislatures that had a 1974 session—and there were more than forty—it is in order and desirable for Governors to call upon the Secretary of the Interior to accept letters of intention with respect to their states' commitment to enact satisfactory legislation when their legislatures next convene.

This is important, for every state whose legislature has met and adjourned in 1974 without having had an opportunity to consider this subject already is in the 120-day countdown after which all resident wildlife, deemed by the Interior Department to be threatened or endangered in the absence of an approved state program, shifts to federal responsibility. States should not be held delinquent because of the impossible time schedule that has been imposed on them. No matter how good a state's intentions or its already operative programs, it will take tons of paper work and years of frustration and needless expense to reverse the situation. It cannot be otherwise, for the new Act is a mouse maze of administrative procedures and other hurdles.

If, as the Administration has said, it wants to move responsibility closer to the people, and if, as the Secretary of the Interior said to the states last fall, the salvation for America's wildlife is vastly better working relationships between federal and state wildlife agencies, then this bureaucratic hiatus should be avoided. The Secretary of the Interior should do everything within his power to prevent the states from being penalized because of the grossly inadequate time schedule in the Endangered Species Act. If this cannot be done administratively, then redress should be sought in this Congress.

Before turning the session to Dr. Gilbert F. White, I want to remind you of a long-established Conference Policy. In the next three days, we all will be involved in a conference, not a convention. For that reason, no resolutions can be entertained. Session chairmen have been instructed not to accept resolutions or recommendations for action. It is hoped that all conferees will take maximum advantage of the scheduled discussion periods following each paper. In this way, additional information and differing points of view can be brought before the Conference.

It now gives me great pleasure to turn the session over to Dr. Gilbert White of the University of Colorado.

# Remarks of the Chairman

Gilbert F. White

Dan Poole, Larry Jahn, and their associates have put together a program which helps focus at the very outset on several developments on the natural resources scene that may have been obscured in the past year and since the last conference. This is especially true in relation to the so-called energy crisis and the tragic aftermath of Watergate, with its attendant wave of apathy and cynicism with regard to the political process.

These may have diverted attention from events that otherwise might have claimed much more attention.

Some of these events involve proposals of government reorganization or of government policy. Some of them involve enactment of new governmental policy which has tremendous potential influence for habitat on the North American Continent and which we will be hearing about this morning.

Virlis Fischer and I will share the running of this session. I shall introduce the speakers and after their presentations, he will accept your questions.

Virlis Fischer is known to many of you. He has been a director of the Wildlife Federation in Nevada. He is a director of the American Forestry Association and a member of the Advisory Group of the Bureau of Land Management.

# Organizing for the Management of Natural Resources

Charles F. Bingman

*Office of Management and Budget,  
Washington, D.C.*

## Introduction

Trends in the United States for the consumption of natural resources are compelling and relentless. If present trends continue until the year 2000, the United States' demand for primary minerals could more than triple, and water withdrawals could be over four-fifths of the entire national streamflow. We would have to construct as many additional houses and other structures as now exist. In the remaining quarter of this century, the United States would use more critical resources than it has consumed throughout its entire history. These are the raw materials of our technologically advanced, consumer-oriented, and rapidly expanding economy.

### *Energy v. Natural Resources*

The energy "problem," like the environmental "problem," has been visible for years. Because of the tremendous economic and social issues involved, there has been little inclination among politicians—or anybody else for that matter—to face up to the major issues frontally. Once again, it has required a crisis in energy resources to precipitate an all encompassing look at our energy condition, and we seem to face a choice of only conflicting and unattractive alternatives.

On the one hand, we can press for a retention of our prevailing "cheap energy" policy of the last half century. This would mean an all out effort to expand existing production of oil and natural gas, increases in coal production and use, continued expansion of nuclear energy, and a new R&D commitment to such energy sources as solar and geothermal. The "social costs" of this policy would seem to be greater profits to energy developers to encourage development, further disruption of the land, water, and environment, and larger federal budgets for R&D.

On the other hand, theoretically at least, we could adopt the policy that we cannot sustain the present pace of growth in energy use. This would mean a commitment to extraordinary national efforts to shift whole patterns of national life to hold down all forms of energy consumption and improve our efficiency in the use of energy available to us. Even accepting that this alternative is possible, the "social costs" are incalculable—an economy of energy scarcity which would drive up prices, constrain economic development, increase unemployment and cause serious dislocation and lessening of the quality of life.

While much can be done to put our patterns of energy consumption on a more rational basis, few believe that we have any real alternative to the continuing struggle to keep energy supply equal to demand. This fact has

absolutely fundamental implications for our natural resource base.

A very large percentage of the potential sources of energy in the United States are found on public lands. If the Outer Continental Shelf is included, 52 percent of our national petroleum and natural gas reserves are on federal land. Seventy-five percent of shale oil potential, 60 percent of geothermal potential, and 40 percent of coal and uranium are also found on federal territory. In addition, energy resource development on private land, particularly for petroleum, is increasingly marginal and further development will, of necessity, be more costly. Even public land development on the Alaskan North Slope and the Outer Continental Shelf will never be possible at costs comparable to those of the past.

The cost of energy will therefore rise. How much it rises, and how fast, will be one of the most complex economic and social equations of the next 25-50 years. It seems clear now that there is no "miracle" technology which will relieve the burden in the next two decades at least. Technology advances during that time frame will, if we are lucky, help to keep us abreast of demand.

We can therefore anticipate very great pressure for further development of the energy resources found on public lands. This can only intensify the frictions we are now experiencing between development and the adverse consequences to our natural resources, since the need for conservation and environmental protection is linked directly to every form of natural resource use.

#### *The Federal Role – A History of Disorganization*

There is no choice but to face up to this recognized conflict. But if our national strategy of accelerated energy resource development is more or less forced upon us, we still have much tactical flexibility available to us. In the past we have defined the federal responsibility in the energy/natural resources arena in categorical and separate ways, yielding categorical, unrelated attempts at solution. Such federal agencies as the Bureau of Reclamation, the Forest Service, the Federal Power Commission, the Army Corps of Engineers, the Atomic Energy Commission, the Park Service, the Soil Conservation Service and others, grew out of a narrow problem demanding a categorical, finite accommodation in the machinery of government. It is not my intent to debate the effectiveness of these organizations—all do important jobs and most of them have worked well most of the time.

The need to reorganize these elements of government is a problem which is older than concern over energy or even "the environment." For more than 50 years, recommendations have been made by study commissions and by successive Presidents. A Congressionally appointed Joint Commission on Reorganization of Government Departments recommended a combination of FPC and the non-military engineering activities of the War Department. President Harding recommended adoption, but Congress refused to act.

President Hoover recommended changes in 1932 which were disapproved by the House. President Roosevelt appointed the noted President's Committee on Administrative Management in 1937 (the "Brownlow" Committee) which led to the creation of a National Resources Planning Board—which lasted just four years.



In 1949, the Committee on Natural Resources of the first Hoover Commission recommended the consolidation of water resources and land management functions in a Department of Natural Resources. The Commission itself rejected these recommendations for a less challenging approach which then failed to pass the Congress.

The second Hoover Commission of 1955, the 1961 Budget Message, and the 1970 report of the Public Land Law Review Commission—all made further recommendations in natural resources. The latter again reinforced the need for a Department of Natural Resources.

Finally, in 1971, President Nixon formally recommended a Department of Natural Resources to the Congress, based on the report of the Advisory Council on Executive Organization known as the Ash Council.

The simple fact is, the Federal Government as now organized cannot effectively carry out its natural resource responsibilities. Bad mechanisms are now thwarting the efforts of good men. Related functions in such major areas as water resources, land management, and recreation, are scattered throughout the executive branch. This proliferation has resulted from historical circumstances, often stemming from a far simpler era when a surplus of resources and limited demand did not require the careful stewardship that is required today.

The costs of the current dispersion of responsibilities and programs within the government do not result primarily from duplication. We in the organization business have learned to be wary of facile claims of large savings resulting from consolidation of related activities.

Rather the costs are attributable to policy and program decisions being made poorly or not at all. This is perfectly understandable, although no longer acceptable, when each of the federal agencies carrying out resource activities has such a limited piece of the action. The information on which each acts is perforce piecemeal and often biased. Problems are defined to fit within established jurisdictions. Programs often operate in the absence of overall, consistent policies. With the best of intent, agency officials expend too much of their energies in protecting or extending their particular turf.

In short, the welter of partial programs and disorganized activities obscures the basic objectives of natural resource management. Government-wide policies may not be made because they affect too many jurisdictions with veto authority. Once made, policies may not be implemented in a timely and efficient manner because of the complications of integrating piecemeal activities of a number of agencies into a harmonious whole. Stewardship for the whole and interdependent physical environment is currently segmented and placed under several independent Federal agencies. Everybody's business becomes nobody's business.

## **The Proposed Department of Energy and Natural Resources**

The basic precept behind the President's proposal to establish a Department of Energy and Natural Resources is that some one individual has to be put in charge of federal activities directed at management of our natural resources. That official has to clearly be accountable to the President, the Congress, and the general public for policies and programs in this area. While all functions related to natural resources cannot—and should not—be placed under him, he

must have sufficient authority for major areas to permit leadership in the formulation and implementation of policy.

The proposed Department of Energy and Natural Resources has been designed to meet the above criteria. The Secretary, reporting directly to the President, would command the capabilities of a department vested with broad authority in the management of natural resources. The authority and capabilities would be acquired through consolidating elements of five departments and two independent agencies.

Let me briefly sketch the consolidations that would be effected within five broad functional areas. Management of *public lands and outdoor recreation* would be fostered by bringing together the Forest Service and the extensive land management and recreation elements of the Department of the Interior. Responsibility for managing nearly 95 percent of all federal lands and approximately one-third of the nation's land would be centralized. Consolidation of the Forest Service and Bureau of Land Management has been recommended by study groups for many years, including the monumental study by the recent Public Land Law Review Commission.

Authority for planning and funding Corps of Engineers and large Soil Conservation Service *water resource programs* would be placed together with Interior's Bureau of Reclamation and other water programs. Functions of the Water Resource Council would also be in the Department, thereby providing broad authority for river basin planning. These transfers would provide the Department with sufficient clout and capabilities to see that its plans are being followed in the construction of projects.

The department would acquire Interior's extensive authority for *energy and mineral resources* except for energy R&D that would be placed within the new Energy Research and Development Administration. The department would acquire a small uranium and thorium assessment program from the Atomic Energy Commission. In sum, the department's authority for energy resources in their natural state would not be weakened as a result of other reorganizations taking place. In fact, existing authority would in some cases be broadened through emergency legislation before the Congress.

Consolidation of Commerce's National Oceanic and Atmospheric Administration with Interior's Geological Survey would help us better understand *oceanic, atmospheric, and earth sciences* phenomena and the interactions among them. Division of responsibility between these two scientific and technical service agencies is now often arbitrary. Both agencies perform similar or closely related mapping, hydrologic, oceanic and earth science activities. Interior's weather modification programs would benefit from NOAA's atmospheric capabilities. Potential effectiveness, and efficiency in utilization of common technologies, such as satellites and computers, could be considerable.

The Department would also be responsible for *Indian and territorial affairs*. This is admittedly an anomaly because the purpose of the new department is management of natural resources rather than care of human needs. However, Indians have generally felt their identity would be better protected in a natural resource context, partly because of their ties to tribal lands. The Administration would accede to their concerns until a mutually acceptable alternative is developed.

These functional areas of the Department would each be headed by an

Administrator with line authority over operating programs. They would have Regional Administrators overseeing programs in the field.

This division of responsibilities among five broad functional areas under high ranking Administrators would provide the Secretary with a manageable span of control. He would have a Deputy, Under Secretaries and other departmental officials, including Regional Directors, providing department-wide perspectives and assistance. A sound field structure would help deal with needs and problems on the spot.

In this regard let me emphasize that a principal objective of the reorganizations is to benefit the ordinary citizen in dealing with his government. Consolidations would simplify contacts by public interest groups, the general public, and State and local government. There could be more meaningful public participation through total area planning regardless of administrative jurisdiction.

## Discussion

MR. BINGMAN: I want to augment my remarks here by talking a little about the status of this proposal in the Congress.

The proposal for a Department of Energy and Natural Resources has been deferred by Congressional action. The Administration proposed a Federal Energy Administration to the Congress in early December to replace the Federal Energy Office which was set up by the President by Executive Order while he sought the statutory authority to create the new agency. At the same time, we continued to press rather urgently for creation of an Energy Research and Development Administration, which would do R&D for all forms of energy and would be built on the present Atomic Energy Commission.

With the passage of these energy related bills, we will return to consideration of DENR. We believe that the debates of the energy crisis have generated a heightened interest in DENR as our "ultimate" energy and natural resources organization and therefore this proposal is very much alive and will receive serious consideration.

VICE CHAIRMAN FISCHER: Ladies and gentlemen, Mr. Bingman's excellent presentation mentioned, in passing, the subject of reorganization of the federal resource agencies. I think many of us agree that it is an idea that has much merit but there has been a lot of controversy on how to go about it.

I am sure it is a subject that should generate some interesting discussion.

DR. JOSEPH LARSON: [University of Massachusetts]: Your remarks concerning reorganization are in contrast to the remarks at the opening, where you essentially stated that the Administration's approach to the energy problem is to deliver more energy to an uncontrolled demand.

I think this, as such, needs to be challenged. It was challenged recently in a Ford Foundation report.

I want to ask whether the decision to go this route is not really concerned with socio-economic problems of the energy crisis rather than the realities in Washington.

MR. BINGMAN: I hope I did not say that that the Administration will allow energy consumption to go uncontrolled.

I tried to draw a contrast between two major policy styles. One would be a serious attempt to shift national patterns of consumption in a very radical way, such that we could stabilize or even conceivably reduce current consumption or hold down the rate of increase in consumption over a period of time.

I expressed the belief—and I realize there is substantial debate about this—that it is going to be highly unlikely that there is not going to be a continuing increase in consumption of energy, even if this Administration and succeeding Administrations manage to pursue an intelligent and effective program of energy conservation.

Having said that, the very thrust of my early remarks was exactly as you indicated. This will be one of the social and economic issues over the next twenty-five to thirty years. I don't see any easy way out of it.

MR. DAVID G. SOBERS: [Maryland]: I would like to direct my remarks, if I may, to a topic other than federal organization of natural resources management.

In 1972, the Congress passed a water quality act which provided for water quality standards and a funding program for water pollution abatement.

Since water pollution abatement has remarkable effects, not only on citizens but on wildlife as well, I would like to know why the Administration, particularly the Office of Management and Budget, has chosen twice to impound funds for water pollution control activities and why it continues to drag its feet through not only that office but the Environmental Protection Agency, toward allowing states to get on with the program regarding water discharge permits for cleaning up current water pollution problems?

A case in point was a discussion on the "Today" show on NBC, on water pollution abatement in the Great Lakes area. Canada is three years ahead of us and we have no projects in sight for final water pollution abatement.

MR. BINGMAN: My responsibilities in OMB have nothing to do with budgeting in this area. I am on the management side dealing with organization proposals. I am simply not conversant with details of OMB action or other general action in that area and, therefore, I cannot give you a responsive answer. I am sorry.

VICE CHAIRMAN FISCHER: Are there further questions?

MR. JIM WEISS [Wyoming]: You stated that the Federal Government owns most of the property where the sources of energy exist. Of course, this is true. It is further true that the mineral resources were reserved by the Federal Government and so it will not matter whether it was on public or private lands.

In our state today, where some of the greatest coal beds lie, we have been flooded by masses of people who are living in every draw, in every canyon, in caves and tents, upon the public land and around the small cities. They are a pollution problem; they are a crime problem, they are a real problem to us.

We do not have the tax structure to take care of this burden, to build sewers, to furnish schools, to furnish police departments and fire departments.

Now, on that basis, especially in relation to your discussion of reorganization—is there any plan to assist some of us people in these states with a small tax base to do some of these things prior to the time they lease some of these major coal beds to the great industrial companies in this country?

MR. BINGMAN: I know of no particular plan which addresses the specific problem to which you refer, except that there are a variety of federal programs intended to operate in communities anywhere in the country, including new programs in the rural development area, that might well more specifically impact upon your problem.

I am not sure how you characterize the build-up of population that you are describing—where it comes from, who they are, whether they are there in anticipation of some known extended leasing of mineral rights or what.

We have spent a couple of decades trying to cope with the problems of flux in population in relation to large urban areas and the government and various agencies have a wealth of experience, possibly a lot of it incompetent, as to how to cope with increases in population in urban areas.

Perhaps some kind of program might be constructed out of that experience. Perhaps we could do so if we had a better definition of why you think the problem is occurring.

MR. WEISS: The problem is occurring, sir, because the federal agencies have leased these coal operations and made the leases before we have had an opportunity to answer questions of housing, pollution problems and the like. I think it is a result of all the mineral leases.

VICE CHAIRMAN FISCHER: Thank you, Mr. Bingman, for fielding these questions so adroitly, even though they were a bit beyond your field.

# The National Water Commission Report in Relation to Wildlife

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## Introduction

A review of the report of the National Water Commission will reveal that the topic of wildlife is dealt with directly in only four pages comprising Section J of Chapter 5. Three of the Commission's 230 recommendations appear in this section. This score should not be surprising as the Commission was charged with a study of water resources policy — not wildlife management. The Commission was, however, well aware of the environmental issues that have been raised in relation to water resources development and attempted to present a balanced viewpoint consistent with the need to assure the nation of adequate supplies of good quality water while minimizing environmental impacts arising out of the water management efforts.

The National Water Commission was created by PL 90-515 of September 26, 1968 and consisted of seven members appointed by the President. The Commission was authorized to spend up to five million dollars in a five-year period. The Commission Report *Water Policies for the Future* is 579 pages and was published in June of 1973. A shorter summary report, *New Directions in U. S. Water Policy*, was released at the same time, as were *A Summary-Digest of the Federal Water Laws and Programs* and *A Summary-Digest of State Water Laws*. Sixty-two background reports covering the gamut of water resources topics were also released through the National Technical Information Service so that interested persons might obtain them. These background reports were prepared by specialists for the information of the Commission. The Commission does not necessarily endorse the reports in full and did not, in all cases, follow the recommendations made in these background studies. More than 22,000 copies of these reports had been sold by mid-1973.

The Commission began its activities with a series of regional conferences in which we asked for suggestions as to the topics which the commission might investigate and positions on these topics which local people would support. When a draft of the final report was available in November 1972, a second series of regional conferences was organized so that those who wished might comment on the tentative draft. Over 700 persons representing state and local government, business and industry, local and national organizations, and private individuals testified in the two sets of hearings and several thousand written comments were received on the draft report. The final report reflects many of the comments received at the hearings or by letter.

The titles of the two reports *Water Policies for the Future* and *New Directions in U. S. Water Policy* reflect the Commission's concern to look ahead — not backward — as we developed our recommendations. Many of our critics point to the successful past history of various programs in support of the contention

that these programs should be continued or expanded. Times have changed, however, and programs and policies appropriate even a few decades ago may now be out-of-date. We urge our readers to think of the report in terms of the future — not the past.

### **Seven Themes**

It is hardly feasible to review in detail in a brief presentation, a report with nearly 600 pages. Inspection of the report, however, will show that seven themes are recurrent throughout and a restatement of these themes summarizes the broad viewpoints of the report, if not the specific details. The seven themes are:

1. Future demands for water and water-related services are not inevitably fixed, but will depend in large part on policies which are within the control of society. Thus, planning for future water use should not be based on a single projection of need based on past history. Rather, planning should be based on “alternative futures” which embrace the possible range of policy, technological change, population change, and other factors which will determine the future water demand.
2. National priorities are shifting from development of water resources to restoration and enhancement of water quality. Resources development, as such, should never have been a national goal — goals should be stated in terms of the results desired from resource management.
3. Water resources planning and land use planning must be much more closely coordinated than they have been in the past. We should decide how we wish to use our lands and manage water resources accordingly. Water development should not determine land use, although the possibility of water development should be a factor in planning land use.
4. We must give much more attention to policies directed toward water conservation — the efficient use of water. Water is a resource which should not be wasted in most parts of the country. Even if there is abundant water, its more efficient use will conserve on the resources which must be invested to make it available.
5. Decisions with respect to water development should be based on an evaluation using sound economic principles. Water development projects should yield a net return to the nation. This does not mean that non-economic considerations should be excluded from the decision, but rather that to the extent economic considerations enter the decision process, they should be soundly based. One of the economic factors distorting the economic decision has been subsidy. In order that the demand for products and services of water development be correctly estimated, the Commission believes it desirable that identifiable beneficiaries pay the full cost of the products and services they receive, except where the benefits are of broad national importance.
6. Many laws and legal institutions governing water development and management had their origin many years ago—some are more than a century old. These laws and institutions should be re-examined and, where

necessary, revised to bring them into accord with the social needs of the present day.

7. Development, management and protection of water resources should be controlled at the level of government nearest the problem and having the necessary authority. Government at this level is generally most capable of representing the varied interests involved.

## **Recommendations Related to Wildlife Management**

Inspection of the report in detail shows at least 32 recommendations which I believe deal directly with issues affecting wildlife. Some 17 additional recommendations may have indirect impact on wildlife issues. It should be noted here that the National Water Commission could do no more than recommend. If the recommendations are to become effective acts of Congress, Executive Orders, acts of state legislatures and ordinances by local governing bodies will be required. In some cases, a positive response by the public will also be needed. Thus, the ultimate decision on the Commission's recommendations rests more in your hands than mine.

Detailed discussion of the 49 recommendations which I believe may have important impact on wildlife problems would be impossible in this paper. I propose, therefore, to summarize the recommendations of specific chapters. I hope this will stimulate interested persons to read the relevant recommendations and the supporting text.

Chapter 2, which discusses water and the environment, contains only four recommendations — all relevant. The first recommends that all water development plans should include measures to protect the estuarine and coastal environment and the cost of these measures should generally be borne by the project beneficiaries. Since most streams ultimately discharge to the oceans, activities on them may impact the coastal environment. Consideration of these impacts should be a normal part of project planning. The remaining three recommendations of Chapter 2 deal with the procedure known as “channelization” — the straightening, widening, and clearing of streams so that they will better carry flood flows or enhance drainage of adjacent wetlands. The recommendations suggest that the planning agency should include in the project costs such items as increased flooding downstream, sedimentation, loss of wildlife values and aesthetic considerations. Costs of channelization projects should be allocated to beneficiaries; and private owners whose land values are enhanced by the project should pay their full share of the costs. Finally, an environmental impact statement should be filed on all channelization projects.

Chapter 4 contains the Commission's sixteen recommendations on Water Pollution Control. These recommendations call for a strong and rigorously enforced program of quality improvement aimed at achieving current water quality standards within a decade. Such a program will cost more than the nation has spent on all water development in its history. I will not expand on the details, but I should point out that the Commission does not support a no discharge policy. Rather it feels that the assimilative capacity of the stream should be used where it can be used without damage and waste discharges which will cause no damages should be permitted. We believe that it is possible

under reasonable standards to achieve a water quality level which will be approved by the American people, but that it would be wasteful of other resources to attempt to achieve a level of stream purity which may never have existed in our streams. The cost in resources to remove the last one percent of impurities in wastewater is about equal to the cost of removing the other 99 percent.

Chapter 5 is entitled "Improving Water Related Programs" and deals with most of the ongoing programs of the Federal Government. With respect to flood mitigation, the Commission calls for much heavier reliance on flood plain management with the seriously threatened flood plains set aside as open land, parks, or for other uses which will not be harmed by periodic flooding. Much valuable wildlife habitat could be preserved under such a policy. With respect to the use of water for cooling electric power plants, the Commission called for a program of energy conservation — not to save oil — but rather to slow the growth of new power plants with their attendant heat loads which must be dispersed. Also recommended was an intensive research plan to develop power systems with lower waste heat levels, better means of disposing of waste heat, and ways in which waste heat can be put to useful ends. Recommendation 32 of Chapter 5 urges an increased emphasis on erosion control to minimize stream pollution from sediment and from the chemicals which sediment so often transports to the stream. In relation to the recreation benefits of water projects the Commission recommends that the benefits of free stream recreation — fishing, whitewater boating, etc. should be considered on a par with the benefits which may occur if a reservoir is built.

Section J of Chapter 5 deals with fish and wildlife aspects of water programs. The first of three recommendations calls for rigorous adherence to the Fish and Wildlife Coordination Act (PL 85-624) and proposes that the Water Resources Council should develop procedures so that fish and wildlife values will be treated on a par with other project purposes. The second recommendation calls for increased research directed to understanding fully the impact of water development on fish and wildlife values. The third recommendation calls for all states to provide statutory protection for fish and wildlife values on non-navigable inland waters which are not subject to Federal jurisdiction.

Under the title "Making Better Use of Existing Supplies," Chapter 7 deals with a number of aspects of conservation and improved management of our water resources. Of special interest to wildlife interests are a series of recommendations in section E designed to enhance the social values of water. The recommendations include proposals to revise state water laws so as to include instream uses for fishing, recreation, and purely aesthetic considerations as uses eligible for water rights. States are urged to enact laws protecting wetlands having value as wildlife habitat from being drained and to provide a better public access to streams and coastal waters through access easements and other devices. Section G, Chapter 7 contains ten recommendations directed at promoting more efficient use of water on the farm, in the home and in industry. More efficient use means less diversions from our streams and fewer structures to store and control water. Finally, five recommendations in Section H of Chapter 7 encourage greater use of reclaimed wastewater for purposes other than direct human consumption. Such use is a water conservation measure



since the reclaimed wastewater can replace fresh, potable supplies now used in ways where wastewater would serve as well.

Chapter 8 of the report deals with Interbasin Transfers, a subject specifically referred to the Commission in its authorizing legislation. The Commission believes that interbasin transfers are no different than any other water projects and that they should pass the same tests of feasibility, i.e. they should be economically feasible, socially desirable and environmentally sound. The direct beneficiaries of an interbasin transfer should expect to pay the full costs of the transfer including the cost of compensating the area of origin of the water for benefits foregone.

Chapter 10 is entitled "Better Decision Making in Water Management." Six of its eighteen recommendations deal with increased public participation in the water resource planning process and in the process of licensing private projects which require Federal licenses. There seems to be no better way for social and environmental values to be fully represented in this process than by full participation of interested publics. Such participation, however, must be encouraged by the responsible agencies through procedures which permit the public meaningful input throughout the whole process — not merely at a hearing when the plan is complete and ready to be submitted for authorization.

Chapters 15 deals with the important topic of "Cost Sharing" or "Who Pays for Federal Water Projects." Hitherto, fifty to eighty percent of the cost of federal projects has been borne by the general treasury. Beneficiaries have, of course, been delighted to gain the benefits of the projects while paying only a small fraction of the cost. More satisfactory alternatives which would incur higher local costs are often bypassed for the seemingly "cheaper" federal project. If a federal project has an economic benefit-cost ratio greater than one, as it should, then the beneficiaries will receive benefits in excess of the costs and should be perfectly capable of repaying their share of the costs while still coming out ahead financially. If the prospective beneficiaries refuse to pay this share, it can be presumed that the benefits are not as high as projected or that the beneficiaries have other ways in which they prefer to spend their money. Thus full repayment seems to be the ultimate test of the economic and financial feasibility of a project. It seems quite likely that a full repayment policy would reduce the number of Federally built water projects, but it surely would not stop those projects which are economically sound and really needed.

Chapter 17 deals with "Basic Data and Research." The recommendations regarding data note that while much effort has been devoted to collecting hydrologic data on water, there has been no systematic program for collecting the peripheral data needed for good planning. Greater emphasis on data relating to the ecology of water bodies and to the social implications of water, both in its natural state and under development, is recommended. The principal recommendations with regard to research is that those topics which will enhance good water planning should be priority items. It is reasonable to presume that research on social and ecologic impacts of projects would stand high on such a priority list.

## **Conclusions**

As might be expected, reaction to the Commission report has been varied. One witness saw in the report the guidelines for total economic collapse of the

nation. Another witness saw the report as extraordinarily sound and said "someone up there goofed to appoint seven such commissioners." As an engineer who has spent his entire professional life in the area of water resource management, I see the report as setting forth policies which can lead to better planning with a wider consideration of alternatives and of public viewpoints. I do not know your reaction, but whatever it is, I urge you to contact your Congressmen, state legislators, and local government officials and tell them your views. Naturally, I hope you will endorse the Commission, but even if you do not, speak out. Citizen views will get attention only if articulated. If you disagree with the Commission position, I ask only that you read the report. Many of our most outspoken critics have not.

## Discussion

MR. ROBERT GEROLD [National Audubon Society]: For many years, we have watched destruction of habitat and it has taken a long time for many of the federal agencies to begin to switch around.

Along the Arkansas River, we have a recent case where a private party went in and cleared off a hundred acres of vegetation, primarily cottonwood trees, and claimed traditional water rights. His case was just recently adjudicated and he was given an additional 1.4 acres.

This could be a horrible precedent. Do you have any comments you would like to make on this?

MR. LINSLEY: I don't think I can comment on it specifically, especially without knowing more of the details involved in that particular instance.

If the agency removing the vegetation does increase water yield, at least temporarily whether it is a good thing to do or not, depends upon the traditional water supply and also on many other factors, which likewise ought to be evaluated and considered. I believe that is about the only answer I can give you to that particular question.

MR. GREINER: [Wisconsin]: I believe the discount rate comes into as much controversy as anything. Would you care to comment on your personal views regarding that?

MR. LINSLEY: The Commission recommended a five percent rate. My personal view is that the discount rate is not as important as many other aspects of planning—you have to do a good job of planning—and, of course, it is easy to see what happens if you change the discount rate.

The arguments in favor of a high discount rate are, primarily, that a very high rate is designed to discount the future and, therefore, make the project less tenable.

If the future is uncertain, we ought to discount in some other way in our consideration of alternative features rather than arbitrarily using a high discount rate.

JOHN KRUTILLA [Resources for the Future]: I would like to follow up on the discount rate.

Another way of looking at the discount rate is that it can represent the opportunity for alternative use of this capital. In short, it is the price of capital and if one uses an artificially depressed discount rate, considering the fact that the cost of water projects is basically capital cost, what one is doing is simply providing subsidy to the capital development of up to forty and fifty percent.

Do you want to comment on the influence of a discount rate on planning?

MR. LINSLEY: The Commission recommends taking care of subsidy in another way, by asking full repayment of costs. You are quite right, that the depressed rate does encourage construction of capital intensive projects.

The Commission settled on a rate which is the rate of interest on Federal Government obligations, in the belief that somebody has to look to the future. This rate, the Commission felt, was a federal responsibility and justified a lower rate for federal considerations than might be extended on the private market.

You are probably as familiar with this debate as I am. It has gone on for years and there are economists on both sides of the argument.

I am sure that there isn't any wholly satisfactory answer to the discount rate, but I do

believe that other features of the planning process, properly taken care of, will eliminate many of the things that proponents of the high discount rate have been advocating.

VICE CHAIRMAN FISCHER: In the field of water policy, one thing that would be of exceptional interest to a wildlife audience is the recommendations of the National Water Commission.

MR. MAITLAND SHARP [Izaak Walton League]: I have read much of the Commission's report. It is an excellent document. However, I think it is flawed by chapter IV concerning water pollution control.

I was struck this morning by your comment that zero discharge would tend to result in water cleaner than it was before the arrival of the white man on the scene. I would point out that zero discharge applies to zero discharge from point sources rather than nonpoint sources as may have existed or in fact did exist before the arrival of the white man and industrialization.

I will admit that the point here is that even if we should achieve zero discharge from point sources, we would not have absolutely clean water—we would not even have water cleaner than it was before the rise of industrialization.

MR. LINSLEY: I am not sure that anybody knows what zero discharge means, especially in relation to the 1972 amendments.

If it is taken literally, waste streams from municipalities shall contain no pollutants; this means distilled water. On the other hand, I suggest you contemplate what the Missouri River might have been like after a herd of half a million buffalo had forded it.

VICE CHAIRMAN FISCHER: Is it fair to say that, so far, only a couple of the recommendations of the Committee actually have been translated into law or administrative procedures?

MR. LINSLEY: A few. I am not sure whether it is two or three, however, it is a small amount.

CHAIRMAN WHITE: We have been dealing so far this morning, first with proposed reorganization which, in the resources sector, has not yet been translated into law, except insofar as the two initiatives which Mr. Bingman referred in the energy field.

The National Commission's recommendations in the water field are largely on the table now and will be the subject of further discussion and possible legislative action in the future.

We are now about to turn to two reports on activities that are under way.

One of these has to do with the new standards and principles related to the whole program of the Water Resources Council and the other the activities of the Corps of Engineers which, in recent months, have involved some very significant shifts in water policy as it relates to the environment.

# Water Development—Better Planning

Warren D. Fairchild

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The U. S. Water Resources Council was established by the 1965 Water Resources Planning Act (P. L. 89-80). In this Act it was the stated policy of Congress to encourage the conservation, development and utilization of water and related land resources of the United States on a comprehensive and coordinated basis by the Federal Government, States, localities and private enterprise with the cooperation of all affected federal agencies, States, localities, and others concerned.

The Water Resources Council has, since 1965, been working toward several goals as set forth by the Water Resources Planning Act. They are:

- The preparation of plans for the major river basins of the Nation;
- The coordination and assessment of Federal and State policies in relation to the Nation's water requirements;
- The establishment of principles, standards and procedures for planning river basins and Federal water projects;
- Recommendation of national water policy to the President which reflects changes in national requirements, priorities and values;
- Establishment of and assistance to river basin commissions, interagency committees and coordinating groups;
- Administration of federal financial grants to states for water and related land resources planning.

Let me briefly introduce you to some of our program efforts.

In planning, a valid question often comes up as to why there is a need for continued water resources planning when there is such a backlog of unbuilt projects. Well, to answer this question we must remember that this is a great and dynamic nation with continually changing requirements, priorities, and values. These changes many times have placed heavy demands on water and related land resources that may be in limited supply or inadequately developed. Projects planned many years ago may or may not be in the correct mix to meet the requirements of today.

The present situation of water for energy is a case in point. In several regions, water may very well be the limiting item in realizing the production of energy from oil shale. Through planning, much at the federal level, this nation has been generally assured of an adequate water supply to meet municipal and industrial requirements, food and fiber production, to provide for recreation, and fish and wildlife, as well as protection from floods. Water resources planning for the U. S. Army Corps of Engineers, Bureau of Reclamation, and Soil Conservation Service in Fiscal Year 1975 shows that this item runs from 4.5 percent to 7.5 percent of the construction budget of these agencies. This is a remarkably low ratio and a sound investment in the future.

The water planning budgets of seven major federal agencies will be over \$200 million during Fiscal Year 1975. Congress recognized the need and desirability of coordinating this planning effort when it enacted the 1965 Water Resources Planning Act and included Section 209 to the 1972 Amendments to the Federal Water Pollution Control Act (P. L. 92-500). Section 209 calls for the President, through the Water Resources Council, to complete Level B plans on all river basins in the United States by January 1, 1980. The specific objective of such studies is to integrate and coordinate water quality, water quantity and land planning.

### **Coordinated Comprehensive Planning**

The present program of water resource planning was in response to a recommendation of the Senate Select Committee on National Water Resources that "... the Federal Government in cooperation with the States, should prepare and keep up-to-date plans for comprehensive water development and management for all major river basins of the United States. ...". Thirteen framework studies have been initiated since 1962. All but one have been completed. These studies cover 70 percent of the land area of the coterminous United States with 80 percent of the total population.

In addition to the framework study program, 16 areas having more complex and immediate natural resources problems were initially selected for more detailed river basin and regional plans. Nine more of these studies have been started and one study was dropped from the program. Thirteen of these reports have been completed and 11 are underway.

These river basin reports are being used as the principal guides and references by the Water Resources Council and others in determining future priorities and programs. For instance, the Ohio River Basin Commission reports that of the 476 project recommendations in the Wabash River Basin plan, 171 have actions completed or underway, and it is estimated that 78 more will be initiated within the next 2 years.

### **National Assessment**

The Council completed its first assessment of the nation's water resources in 1968. Some very valuable information was developed in that program. For example, it was found that in the Rio Grande Valley the consumptive use of the water supply was approaching 90 percent in 1965 and would exceed the supply by 2010. The withdrawal of water presently exceeds the supply by 40 percent, resulting in considerable re-use and deteriorating water quality.

A similar situation exists in the Colorado River Basin which is one of the most highly developed and utilized rivers in the world. A significant portion of this nation's fossil energy resources is in the Upper Colorado River Basin. Water use and demands in this basin will require additional water planning in light of the present energy situation. Such planning may well indicate the need for additional water development as well as reallocation and improved management of existing supplies.

The primary focus of the Council's 1975 National Assessment is to identify and describe the nation's water resources problems and establish priorities for their solution. It will highlight what immediate decisions must be made to

resolve the more severe problems facing the nation prior to 1985 and identify those problems which will become severe between 1985 and 2000. This will be accomplished from two viewpoints — national and state/regional.

### **Title III Grant Program to States**

The Council has granted some \$22 million of federally appropriated funds to states since this program was initiated in Fiscal Year 1967 under authority of Title III of the Water Resources Planning Act. These funds have been made available to all 50 states, District of Columbia, and Puerto Rico.

A principal objective of this grant program is to develop and strengthen state capability in water resource planning. This program has been very successful in achieving this objective.

The states have almost tripled their monetary input for water resources planning since 1965. These grants have assisted 15 states in developing their state water planning organization and 30 state water planning programs have been initiated since 1968.

Title III grant authorization terminates on June 30, 1976. The Council now has this activity under review to determine what recommendations should be made regarding the future of this program.

### **National Water Policy**

It is the position of the Council that there is a need and an opportunity to evolve a more rational national water policy. The present backlog of authorized but unfunded projects, as well as unmet needs and opportunities, testify to the urgency for action in this area.

National water policy issues are generally quite controversial. The recommendations of the recently expired National Water Commission is an example, and we are continuing to study and will make further comments on this report. The Water Resources Council will arrive at its own conclusions and is not tied to the recommendations of the National Water Commission. We have inventoried the 232 recommendations of the National Water Commission, and these recommendations will serve as valuable references in selecting and prioritizing water policy matters to be studied by the Council.

### **The Council's Planning System**

Methods of planning for the nation's water and related land resources have evolved over the years, especially since 1936 when Congress stated a national policy of relating benefits of water improvements to their costs. Many analytical procedures have been developed to measure monetary benefits and costs of water projects. Attempts to measure and consider nonmonetary effects have been less successful.

After a considerable amount of time, deliberation, and review, the Water Resources Council published on September 10, 1973, new "Principles and Standards for Planning Water and Related Land Resources." The President, in announcing his approval of the new principles and standards, said: "They represent the culmination of several years of review by the Water Resources Council to develop improved planning criteria, to achieve our goal of wise use

of the Nation's water and related land resources, with full consideration to the protection of our environment."

This year, something on the order of \$4.9 billion will be spent on federal water and related land projects and programs. With a price tag like that, it should be clear that the criteria for evaluating such programs — criteria established by the "Principles and Standards" — are extremely important. What are the Principles and Standards? Why were they developed? Whom do they affect? — A little history would help here.

In the past, most planning activities reflected a national commitment to economic development — industrial expansion, jobs, per capita income, gross national product. Water and land resources were considered fuel for this growth. Consequently, the cost of federal projects and planning programs were measured against potential monetary return.

Recently, however, we have begun to recognize that *standard of living* and *quality of life* are not necessarily the same thing. We realized that we had developed resource management concepts and a planning process which failed to account for environmental impact in any meaningful way.

Recognizing this problem, the Council, as part of its statutory responsibility under the Water Resources Planning Act of 1965, began developing certain "Principles and Standards" — guidelines if you will — for assessing environmental quality effects of water and related land resource plans and projects on an equal footing with economic effects.

It took about 3 years, with the help of hundreds of government officials and private organizations, and on December 21, 1971, the Council published "*Proposed Principles and Standards for Planning Water and Related Land Resources.*" Three months later it had collected almost 12,000 comments from approximately 4,800 respondents. Revisions followed and, on July 24, 1973, the Council forwarded its recommendations to the President, who approved them on August 3.

The Principles and Standards recognize two co-equal objectives in water planning: *national economic development* — that is, increased production of goods and service — and *environmental quality* — the enhancement of physical, ecological and aesthetic characteristics. In addition, careful consideration is given to beneficial and adverse effects on regional development, and social well-being. Accounting for environmental quality, national economic development, regional development, and social well-being gives planners, affected publics, Congress and others an opportunity to evaluate fully the projected effects of a given plan or set of alternative plans.

Basically, planners must come up with at least two alternative plans — one maximizing the objective of increased national economic development, and the other maximizing environmental quality. Then, based on preferences expressed by affected publics, a recommended plan is selected, either from one of the two alternatives, or possibly a compromise between the two.

The process of going from a resource problem someone has identified to selection of an equitable plan involves basically five steps:

(1) First, important components of each of the objectives have to be clearly identified as they relate to the specific site or area where the planning is being done. For example, increased farm yields might well be an important compo-

ment of the economic objective. At the same time, improvements in water quality by eliminating sources of fertilizer and pesticide runoff from farms could well be an important component of the Environmental Objective. As you can see, there are tricky tradeoffs right from the beginning, and a clear understanding of public preference is essential.

(2) The second step is to evaluate existing natural and economic resource capabilities and then determine what future economic and environmental conditions might be without a coordinated plan.

(3) Third, the planners must begin to develop alternative plans for solving perceived problems — perceived, that is, by both the planner and his constituents, the affected public.

In keeping with the two-objective system, the alternative plans will reflect varying emphasis across the spectrum of economic development and environmental quality.

(4) In step four, the beneficial and adverse effects of these alternative plans are examined against four accounts:

- *national economic development*, including perhaps increases in goods and services, such as water supply, more efficient production and use of energy, flood prevention, improved public transportation;
- *environmental quality*, such as improved water quality, wetlands and wildlife protection, open space and green belt provisions, wilderness;
- *regional development*, including beneficial and adverse effects on employment and regional income, improved population distribution; economic stability, and finally
- *social well-being*, including beneficial and adverse effects on income distribution, life, health, safety, education, and cultural opportunities.

With this information in hand, the monetary and nonmonetary differences between, and tradeoffs among each alternative plan can be clearly shown, and a rationale can be developed for choosing the best alternative plans to meet the two Objectives.

For example, a plan may emphasize contributions to the *EQ Objective* and, in addition, include complementary contributions to the *NED Objective*, such as water supply for municipal and industrial needs.

Another plan may include significant contributions to the *NED Objective* and, in addition, include contributions to the *EQ Objective*, such as consideration of water quality, fish and wildlife, and flood plain zoning.

(5) The fifth and final step is the selection of a recommended plan from among the alternatives available. Because of constant public input to this planning process, the final recommended plan will, to the best of current understanding and knowledge, reflect the preferences and economic-environmental emphasis desired by the public involved. Of course, this five-step process includes constant review and revision as opportunities and problems arise. Planning is a dynamic process, not a lock-step.

**In reality, won't a plan be turned down unless it shows net national economic benefits?**

Not necessarily. A recommended plan must have net economic benefits *unless* the deficiency in net benefits results from additional economic costs incurred to



serve the environmental quality objective. In other words, a plan with less than net *economic* benefit can go through if it has overriding long-term *environmental* benefits. In addition, an exception may also be made by an agency head for consideration of overriding social or regional values.

As explained earlier, the new "Principles and Standards" apply to Federal projects and planning programs and to comprehensive Federal-State planning, such as that conducted by river basin commissions.

With respect to the many programs and projects authorized but as yet unfunded — decisions as to which of the backlogged projects will have to be reformulated will be made by each Federal agency head. These will be difficult decisions. The Corps of Engineers, for example, has about 375<sup>1</sup> unfunded but authorized projects with an estimated total construction cost of over \$10 billion. It is conceivable that some of the projects will be excepted from the "Principles and Standards" whereas others may be reformulated.

*The discount* or interest rate is the rate at which benefits and costs are adjusted to a common time basis for evaluating future water resource projects and programs. Prior to March 7, 1974, the discount rate established by the "Principles and Standards" was 6-7/8 percent. This was based on the average cost of Federal borrowing as established by the Secretary of the Treasury. However, Congress, in Section 80 of the Water Resources Development Act of 1974, re-established the discount rate formula based on the Council's December 24, 1968, discount rate rule (5-5/8%).\*

In addition, Congress requested the President to make a full investigation and study of the "Principles and Standards," including such items as the discount rate, a 4-Objective system instead of the current two, and federal cost sharing. With the exception of the discount rate and its application, the "Principles and Standards" as published remain in effect.

The key word in implementing the "Principles and Standards" is "flexibility." Each Federal agency has a number of plans nearly completed — which represent hundreds of thousands of man-hours of effort, and millions of dollars of planning funds.

Rigid initial application of the "Principles and Standards" with no transition period would drastically increase the costs of these projects, cause great delay, and substantially negate the benefits which would accrue from timely approval. To overcome this difficulty, the Council has developed a procedure for retroactive application.

In the meantime, each agency is preparing and submitting to the Council its implementation procedures for consistency with the "Principles and Standards." The Council recently completed its review of Agriculture's procedures and will review other agency procedures as developed. We anticipate momentary receipt of procedures from the Departments of the Interior and the Army.

In turn, the Council is preparing certain Procedures, such as Procedures for applying the Principles and Standards to basin planning to assure consistency and interagency cooperation, and to assist on such technical subjects as retroactive application, evaluation of the social well-being and regional development accounts and cost allocation.

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<sup>1</sup>"Water Spectrum," Vol. 6, #4, 1973

\*5% for F.Y. 1975

Two co-equal national objectives — *economic development and environmental quality*, and the development of alternative plans closely attuned to public desires — this is the heart of this complex process called the “Principles and Standards.”

## Conclusion

We believe our new planning approach will meaningfully respond to local, State, and national needs and priorities. It is designed to account for all impacts of water and related land resource programs, and it will give voice to divergent concerns among a wide variety of citizens at all levels.

As a nation, we can manage our water and land resources to assure a better tomorrow. And we at the Water Resources Council are committed to that goal.

## Discussion

MR. TONY DEAN [Department of Conservation, Illinois]: Since you and I have worked on this problem for a couple of years, I was curious about whether the Council has come down on requiring uniform procedures for implementing standard, uniform principles across the various states.

MR. FAIRCHILD: In February of this year we approved the procedures of the Department of Agriculture on an interim basis. Our review at that time was primarily to determine the consistency of principles and standards in relation to the Public Register.

We have not yet received the procedures from the Department of the Army and the Interior, and we will review these when we receive them.

One of the reasons why this was an interim review of the Department of Agriculture procedures was the necessity for consistency. The final procedures of the federal agencies will have inter-agency consistency.

I am glad you brought this up from the state standpoint. I feel it is quite important that we have consistent procedures which will make it possible for the nonfederal agencies and Congress to review the alternative plans. Therefore, we are going to have to review consistency and improve on consistencies among the federal agencies.

MR. HOLT [Craig University]: I understood you to say that you would favor doing away with a policy of procedure and implementation of some kinds of standards and principles that would allow environmental quality measurements. The comment I have would go back to the discount rate and the reason why, as a wildlife biologist, I feel that a higher discount rate is a proper rate rather than trying to measure cost and benefits.

Is it so difficult to set costs to some of our wildlife and fisheries losses?

At the same time, it may be very necessary for professionals to give a true value of some of our fish and wildlife losses.

MR. FAIRCHILD: The Office of Management and Budget seems to look only at the dollar values. We do need to come to a perspective that still deals with dollars because I don't think we are going to find economists who can deal with environmental quality or fish and wildlife losses.

MR. HOLT: As I interpret this, I think you have two different points of view. One is the matter of desirability of benefit-cost ratio. As indicated in the new principles and standards adopted, there will not be a benefit-cost ratio as such. The reason is that it forces the decision makers to consider things strictly from the economic benefits and costs of alternative proposals, recognizing, of course, that many environmental effects are not quantifiable.

MR. FAIRCHILD: It is true that, under the National Economic Development Act, you can determine a benefit-cost ratio but that is just one of our acts. Therefore, we specifically have left out reference to benefit-cost ratio and the decision makers will have to consider these nonmonetary effects.

That is the first thing. I think it does certainly place additional emphasis on nonmonetary aspects of the program.

Now, regarding the discount rate, whether you agree with it or not, we need to

recognize at this point, that we now do have a legitimate discount rate. This was the decision of Congress as signed by the President and there will be reports formulated on that basis.

However, one thing that is not determined yet is whether or not the Congress or the Executive Branch, in establishing priorities for new authorizations, will apply other screening techniques. We must recognize that until the study is completed and adopted by Congress, we do now have a legitimate rate.

Of course, we also know that the Council is interested in getting a better economic handle on environmental considerations. Not only is the Council coming out with standards but one of the responsibilities is to continually update cost and benefit ratios which are cranked into the economic values. Therefore, we are interested in doing this.

In October of this past year, one of the actions of the Council was to update the price of commodities. All of you, of course, when you go to the supermarket, know what effect that has on your pocketbook, especially the increase in values of commodities as produced by farmers.

I believe those are the only comments I can make in relation to that general question.

VICE CHAIRMAN FISCHER: Thank you, Mr. Fairchild.

It is obvious that there has been quite a bit of interest in the figures involved.

Now, at this time, I would like to turn the meeting back to the Chairman.

CHAIRMAN WHITE: I have some friends in the wildlife field who get bored with discussion of discount rates and benefit-cost calculations. I hope we will not dismiss the question of the amount of discount rate and the mode of economic benefit calculations as being a technicality. Basic to those differences are fundamental differences in assumptions about public aims and values. We do need to probe into them and to be critical of both assumptions and of their implications.

# The Corps of Engineers Role in Balancing Environmental Needs and Society's Demands for Developing Resources

Major General J. W. Morris

*Director of Civil Works, Office of the Chief of Engineers,  
Washington, D.C.*

While reflecting on the theme of this morning's general session, I couldn't help but think of Thomas Carlyle's words: "The world is a thing that a man must learn to despise, and even to neglect, before he can learn to revere it, and work in it and for it." This organization must certainly be commended for trying to spread the message of reverence for our wildlife and natural resources while at the same time working with them and for them.

I applaud you for these fine efforts which, to some of you, may sound hypocritical coming from an Army Engineer. But to those of you who think I am appearing here today under false pretenses, that I have my 'dozer parked outside the hotel next to a long line of concrete trucks waiting to build a dam, I ask that you view the accomplishments and the mission of the Corps of Engineers in the light of the needs of our nation, yesterday and today.

When our new country needed to be explored and mapped, we were asked to do the job, not because we were lobbying in the halls of Congress or camped on the steps of the White House, but because we happened to be the only outfit around with the training and experience to accomplish the task. The same goes for laying out and building the transcontinental railways, pulling snags from the rivers so people and commerce could move inland, battling the vicious floods that carved big chunks out of lands adjacent to our midwestern rivers. When people in the Thirties viewed their parched earth, dying cattle, shabby homes and farms, they demanded that Congress put an end to the flood-drought cycle. We were again tabbed, this time, to initiate comprehensive river basin developments, which led to storage and flood control structures that stored in times of floods and released during dry months.

True, we have built quite an inventory since the fortifications of Bunker Hill, but all at the behest of the generations from the Revolutionary War to the flood-wall at St. Louis.

Today I firmly believe we are as much on your side as anyone. Let me illustrate by providing you with some examples of the changing policies—policies which have brought about new attitudes in the Corps of Engineers towards environmental improvement and its relationship to our water resources program. A number of these new policies, I might add, have been brought about as the result of the closer dialogue which has resulted in the last few years between the Corps and the conservation community.

I am not complaining about the treatment given us by some wildlife and conservation writers, because I am aware that there are times when the Corps

does not do a very good job of communicating with the public and particularly with the conservation community regarding our operations and policies aimed at meeting today's new look at preserving our environment. This is another reason why I am pleased to be here. I recognize that this meeting affords the Corps a wonderful opportunity to start getting our message across.

### **The New Look**

In the remaining time available, I am going to review a few of our policies relating to changes or new concepts in the Corps' approach to the restoration and management of our natural resources.

First off, I would like to address myself to the subject of the energy crisis and that often asked question: How does the Corps feel about relaxing the environmental controls brought about by the National Environmental Protection Act? No doubt many people who ask this question expect the Corps of Engineers to favor fewer constraints or even suspend the law until our energy stockpiles catch up with the demand. But this is not true. As a matter of fact, we have gone on record opposing relaxation or unnecessarily suspending environmental controls.

A number of Corps projects have been changed or delayed, a few even stopped, because of NEPA. And this isn't all bad, because NEPA has provided us with new directions which help make us more aware of what the public wants. And public participation in Corps of Engineers projects from planning to operation and maintenance is the name of the game these days.

### **Lakeshore Management Plan**

Now about restoration and management of our natural resources.

One such policy is our Lakeshore Management Plan which is nearing completion and will soon be published in the Federal Register for comments by the public.

This plan is designed to protect the natural beauty of the lakes, maintain fish and wildlife habitats, and promote safe and healthful use of the shorelines of Corps lakes for recreation by the public.

In order to achieve this goal the Corps is adopting a policy to reduce to a minimum the private, exclusive use of lake shorelines by nearby property owners or others who have installed boat houses, boat ramps, piers, and other recreation structures.

The plan will also prohibit private floating recreation facilities on any new Corps of Engineers lakes, or any lakes that do not permit these floating facilities at present.

The lakeshore management plan will also establish and indicate clearly all prohibited access areas at each lake project which have been set aside either to protect valuable ecosystems or insure the physical safety of the visiting public. Such prohibited access areas include unique fish spawning beds and hazardous areas located near spillways, intakes or dams.

Our District Engineers will also insure that the public participates to the greatest possible extent in the formulation and preparation of lakeshore management plans. This will be done through public meetings, public announcements, and statements in the news media. Each time a significant

modification to the lakeshore management plan is proposed, a public notice will advise the public where a copy of the revisions may be obtained for comment.

## **Permits**

We recently published in the Federal Register our new policy for permits for activities in navigable waters and ocean waters. Certain sections of the new regulations are of great concern to you attending this conference.

You may recall the provisions of Section 10 of the River and Harbor Act of 1899 prohibits the unauthorized obstruction or alteration of any navigable water of the United States.

The construction of any structure in or over such body of water, the excavation or dumping in navigable waters, or changing the course of navigable waters require a permit from the Corps of Engineers.

The Corps' authority, acting for the Secretary of the Army, has been extended to issuing permits for the construction of artificial islands and fixed structures on the Outer Continental Shelf by Section 4f of the Outer Continental Shelf Lands Act of 1953.

As you recognize, this new authority makes it mandatory to obtain a permit from the Corps for the construction on the Outer Continental Shelf of such things as oil rigs, offshore nuclear power plants or offshore petroleum terminals.

Section 404 of the Federal Water Pollution Control Act (PL 92-300) gives the Chief of Engineers, acting for the Secretary of the Army, authority to issue permits for the discharge of dredged or fill material into navigable waters at specific disposal sites. These sites must be selected in accordance with guidelines developed by EPA in consultation with the Secretary of the Army. EPA can prohibit or restrict the use of these areas if it is determined that the discharge would have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas, wildlife or recreation areas.

Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (PL 92-532), authorized the Chief of Engineers, acting for the Secretary of the Army, to issue permits for the transportation of dredged material for dumping in ocean waters. This section, similar to Section 404, gives EPA authority to prevent issuance of a permit when it has been determined that the material to be dumped would have unacceptable adverse effect on municipal water supplies, shellfish beds, wildlife, fisheries or recreation areas.

Our general policies for evaluating permit applications require a thorough evaluation of the probable impact of the proposed structure and its intended use on the public interest. That is, a careful weighing of all factors relevant in each particular case. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. The decision should reflect the national concern for both protection and utilization of important resources. Furthermore, all factors which may be relevant to the proposal must be considered; i.e., conservation, economics, aesthetics, general environmental concerns, historic values, fish and wildlife values, flood damage prevention, land use classification and others, including the needs and welfare of the people. No permit will be granted unless its issuance is found to be in the public interest.

## **Wetlands**

Our permit regulations contain policies pertaining specifically to the effect of work in wetlands.

First let me say that we consider wetlands as environmentally vital areas—they constitute a productive and valuable public resource and any unnecessary alteration or destruction should be discouraged as contrary to the public interest. Any work within wetlands areas should not be permitted unless it is determined to be in the public interest. These wetland sites will be evaluated with the recognition that they are parts of a complete and interrelated wetland area.

The District Engineer in whose area a permit application may be filed is required to consult with the Bureau of Sport Fisheries and Wildlife, National Marine Fisheries Service of National Oceanic and Atmospheric Administration, Environmental Protection Agency, and other interested Federal agencies, as well as the appropriate state agency. The purpose is to assess the impact on the public interest. The District Engineers will not grant a permit for work in certain wetlands areas identified as important unless he concludes from his analysis that the benefits of the proposed alteration outweigh the damage to the wetlands and the proposed alteration is necessary to realize those benefits.

In evaluating whether a particular alteration is necessary, the District Engineer must also consider whether the proposed activity is dependent upon the wetland resources and environment and whether feasible alternative sites are available. We require the applicant to provide sufficient data, on the basis of which the availability of feasible alternative sites can be evaluated.

## **Estuary Protection Act**

Congressional policy expressed in the Estuary Protection Act (PL 90-454), required the Corps to give great weight to state regulatory laws or programs for classification and protection of wetlands.

In dealing with areas involving fish and wildlife resources, we have guidance from the Fish and Wildlife Coordination Act which expresses the concern of Congress with the quality of the aquatic environment as it affects the conservation, improvement and enjoyment of fish and wildlife resources.

This Act directs the Corps to consult with the U.S. Fish and Wildlife Service and state agencies responsible for fish and wildlife resources with regard to proposed activities which may impact on such resources. The purpose is to promote conservation of wildlife resources by preventing their loss and damage due to structures proposed in a permit application.

Applications for permits which may affect the quality of navigable waters are evaluated with a view toward compliance with applicable effluent limitations and water quality standards during both the construction and operation of the proposed activity. Certification of compliance as required by Section 401, Federal Water Pollution Control Act, is considered conclusive with respect to water quality considerations unless the Environmental Protection Agency advises other water quality aspects are to be taken into consideration. If the certification provided states that no effluent limitation and water quality standards have been established for the proposed activity, or if no certification is required for the proposed activity, the advice of EPA on water quality aspects

will be given great weight in evaluating the permit application. Any permit issued may be conditioned to implement water quality protection measures as appropriate.

Any unresolved objections regarding the issuance of a permit on the basis of water quality considerations at the District level will be forwarded to the Chief of Engineers for further coordination with the Administrator, EPA, and the final decision.

### **Flood Plain Management**

We have heard much talk about Flood Plain Management. We all know the damages brought about by floods—we have only to recall the last two to three years and the headlines in the newspapers and the scenes we either saw in person or on the television screens. It seems that with each flood we hear of more loss of lives and property damage. Well, what's the answer? We know that structural flood control is not the complete answer. Structural controls have done the job they were designed to do; namely, to protect the areas that are already in the flood plains.

The Corps' goal is to prevent encroachment of flood plains so that when a river overflows its banks there will be less damage. Since the Corps got into the flood protection operations in 1936, we have had to depend on the use of levees and dams, concrete channels and diversions. However, when proper land development controls are put into practice by the states, we feel that flood damage and disruption will be cut considerably. The land-use regulations are the responsibility of state and local governments.

We have been providing needed flood plain information and related technical and planning guidance to states and communities through our flood plain management services program. The budget request for this program in Fiscal Year 75 is \$11 million—equal to the maximum expenditure presently authorized by law. The Water Resources Development Act of 1974 increased this limit to \$15 million.

I think that all of us recognize that we have to be more and more dependent upon nontraditional solutions for flood plain management. The Flood Disaster Protection Act of 1973 has added even more impetus to this requirement. This Act requires communities having identified flood-prone areas to participate in the Flood Insurance Program by July 1, 1975, or else become ineligible for federally related financing for projects that would be located in such areas. The new law also required owners of property in flood-prone areas to purchase flood insurance if they are to benefit from financial assistance for their property from the Federal Government or from any federally insured, regulated, or supervised lending institution. Eventually, we anticipate that the charge for insurance will be on an actuarial rather than on a subsidized basis. This will act as a real decision factor in flood plain occupancy and a deterrent to unwise flood plain use.

Zoning, along with other nontraditional techniques, will play a large part in reducing these tragic and often unnecessary losses. The Corps will assist the Department of Housing and Urban Development in carrying out the provisions of this new Act by allocating manpower to help conduct the necessary studies on hazards and data for rate-making. We will reach more deeply into the



engineering talents of our District and Division Offices and increase, to the maximum extent practical, our use of architect-engineer firms in these studies.

I sincerely hope that these remarks have convinced you of our changing attitudes and that our new policies and new directions, as evidenced by our programs for lakeshore management, permits, wetlands, fish and wildlife conservation and flood plain management, demonstrate our desire to be your allies in the constant struggle to conserve and enhance our wildlife and natural resources.

Again, my thanks for the privilege of appearing on your program.

## Discussion

VICE CHAIRMAN FISCHER: We have had a most enlightening talk on the efforts of the Corps of Engineers in balancing the environmental needs in society's use of resources.

I have already been told of the difficulties foresters have in balancing environmental needs. Likewise, I appreciate that the Corps of Engineers has its problems also. One of the difficulties is that we hear so little of the 56 percent "no go" decisions but we do hear about the other 44 percent "go" decisions.

MR. M. L. PETOSKEY [Michigan Department of Natural Resources]: I wonder if I could ask the status of studies involving the deepening of the Great Lakes Waterways navigation channels. I believe it is from 27 feet to 33 feet.

We have had trouble in Michigan finding places for spoil disposal. I would compliment the Corps of Engineers for their fine cooperation in several instances. However, we are concerned about this new proposition which seems to tie in with the specification to replace the canal.

MAJOR GENERAL MORRIS: Thank you, sir.

First, let me say that the Welland Canal, to which you refer, is a canal which allows shippers of the Great Lakes to get into the St. Lawrence River. The Welland Canal is in Canada.

There have been some conversations relative to having a parallel canal, what we would call an All-American Canal. We are recommending against it primarily for economic reasons at this time.

With the other canal in operation, we don't feel taxpayers in the United States should invest in another canal as yet. This is still in the formative stage and the Board has not been signed off on that. There will be some changes. However, that is the way I think it is going to come out.

We have not done any dredging in the Great Lakes now for about three years. With the good Lord giving us some of the highest water we have had in the Lakes for the last couple of decades, this has allowed us to keep the Great Lakes ports in operation. Now, when the lake levels go down, we are going to have a big problem in maintaining shipping unless, of course, we can get water quality problems associated with dredging the Great Lakes behind us. Thank goodness, we are closing in on that.

Further, it is going to cost a lot of money but we are going to build disposal areas in the Great Lakes so that we can dredge the major lake ports and put the material behind the dikes and keep the dredged material out of the Lake.

We are doing that because nobody has yet been able to prove that the dredge spoil is not polluted nor has anybody really been able to prove it is polluted. Here again, until we can prove this, then we had better take these precautions. I am not against this, but it is taking time.

I think the lake levels are going down at a sufficiently slow rate that we can get dike disposals worked on.

MR. BRUCE MARKER [Wyoming Game and Fish Department]: I have a question pertaining to mapping services that might be coordinated with the Bureau of Reclamation, that would map the flood plains to furnish information to state planning agencies that would be used by local governments.

VICE CHAIRMAN FISCHER: As I understand your question, it has to do with the feasibility of mapping.

MAJOR GENERAL MORRIS: That is precisely the flood plain information service I was talking about. Yes, we can do that; that is what we are supposed to do under this particular bill. Of course, limitations of funds have an effect but we may do that.

There are other agencies that have data and, certainly, the states can call on them for it. However, as I understand your question, the program you described is precisely the program that I was referring to in relation to the flood plain information study.

With regard to requiring a request from the state or from the local government, that was another point I tried to make. I wish we had authority to do this automatically but we may not do it until requested by the state. You can easily get that request and find out how to do it by looking up the nearest Corps of Engineers Office, the nearest District Engineer. In Wyoming, for example, he might be at Omaha, Nebraska.

MR. RON JANSEN: Did I understand you to say that the Corps presently has the authority to participate up to 80 percent in acquisition of lands that might be in a flood project, where the project would show a viable alternative?

MAJOR GENERAL MORRIS: The bill that was passed has a provision for federal participation up to 80 percent. However, to do that will require a report with a recommendation in it.

In other words, the first thing we need to do is to write the implementing instructions for this. However, as I would anticipate it, when we go into this proposal, we will do the same thing we do in connection with any other proposal. That would be to show a need associated with water—either flooding, water supply or recreation or other problems. The Corps of Engineers would then be asked by Congress to investigate that need and find solutions. In the process of investigating, if nonstructural solutions are the right answer, we would then recommend that a nonstructural solution be undertaken. Then up to 80 percent would be the maximum federal participation. Maybe it would be less.

Maybe if we had another case like the Charles River situation in Massachusetts, or maybe in some of our on-going studies, where nonstructural approaches have been the right way to go, we would recommend those with cost-sharing provisions. If the Congress was to authorize the project, the funds would come.

With regard to projects that have been deferred that might be reactivated, I would say that in connection with all of the projects deferred we ought to look at nonstructural approaches to solving those problems. In fact, there are some in that category that were probably disapproved because we did not have authority to use nonstructural solutions in some cases.

# Concluding Remarks

Gilbert F. White

Before we conclude, I would like to make a couple of observations on the Conference program.

One observation is that we have heard a great deal this morning about new policies that are now in operation and that have great significance for management of habitat. I think it behooves us all to be familiar with them and their implications as soon as possible.

An example is the one to which the last question was directed, namely the matter of policy with respect to flood plain management. This is the topic of a special conference which is being held this summer under the auspices of all of the interested conservation agencies, in which there will be an opportunity to review in very considerable detail the implications of new policies and ways of carrying them out in a practical way in the field.

Second, we have heard a good deal about proposals for changes in policy which are on the horizon. The extent to which some of them are realized will depend on the degree of concern and intelligent support from citizen groups. This applies to a good many recommendations in the report of the National Water Commission.

Third, certain aspects of the resource picture that loom very large in the future may not have received attention this morning. General Morris has referred to what he sees as a looming problem on the water quality in the United States.

With this I will agree, but I would also point out that beyond the concerns with energy supply, there lie several other national and global concerns that a year or two from now may be claiming much more attention than they have received this morning.

One, for example, is the global supply of food. The second is the matter of supply of scarce minerals, other than fuels for energy. The report of the National Materials Policy Commission last summer on that subject was clouded and largely ignored because of the concern with the energy crisis at that time.

My hunch is that, a year or two years from now, these topics may be the ones that will require major readjustments in our thoughts about environmental programs in the United States.

I have been glad to be a part of this session and I want to thank Dan Poole and Larry Jahn in behalf of all of us for setting up the program as they have.



**PART II**  
**Technical Sessions**



# TECHNICAL SESSION

Monday Afternoon—April 1

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## Advances and Needs in Land Use Planning and Management

*Chairman:*

BOYD H. GIBBONS III

Attorney-Author, Resources for the Future, Washington, D.C.

*Discussion Leader:*

FRED P. BOSSELMAN

Attorney; Ross, Hardies, O'Keefe, Babcock, McDugold, and Parsons, Chicago, Illinois

## Remarks of the Chairman

Boyd H. Gibbons III

To orient you, you are now at Technical Session No. 1 with the subject "Advances and Needs in Land Use Planning and Management".

The program correctly states that I am an attorney but incorrectly states that I am an author. Literally, that means somebody who has published something and I am presently in the process of writing a book.

Mr. Bill Reilly of the Conservation Foundation will not be with us today and I will, in turn, substitute for him and attempt to cover briefly the status of state land use initiatives.

The purpose of this session is to cover a subject as broad as almost any social issue affecting the United States. None of us could try to cover it comprehensively. We are going to zero in on it, however, in as accurate a fashion as we can.

The panelists you will hear were selected by me and so I will take whatever brickbats are due for having presented to a convention of wildlife biologists a panel of lawyers.

Not all of us are practicing attorneys but all of us are from the legal profession. On the other hand, I also hope we will stay away from legal jargon as much as possible. Those of you who are used to biological phrases might also remember that such lingo is foreign to most of us.

First, we have Mr. John P. Ingle, Assistant to the Attorney General for the State of Florida, who will discuss the Florida Land Use Act and how it works.

Mr. Charles E. Fraser, of the Sea Pines Land Development and other developments will give the perspective of the developer's role.

We have Mr. Fred P. Bosselman, an attorney from Chicago. He is too modest to admit it but he is one of the foremost experts on the subject of land law reform in the United States.

We are not going to give you four set speeches. I would like each of us, after he has made his presentation, to participate in a short give and take among the panel. Also, in connection with the first two speakers, myself and Mr. Ingle, I will ask Mr. Bosselman to operate as Discussion Leader and, of course, you are all encouraged to ask questions from the floor once we get started. Of course, as in the case of the previous session, we would ask that you identify yourself with your name and organization.



# Land Use: Is it Bigger Than a Breadbox?

Boyd H. Gibbons III

*Resources for the Future*

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The current nostalgia fad may help some of you to recall a radio quiz show a number of years ago in which the panel first would attempt to identify the secret object by asking, "Is it animal, vegetable, or mineral?" This question was usually soon followed by an inquiry about whether it was bigger than a breadbox. I do not propose to begin this afternoon's session with an exercise in "Twenty Questions," but because land use seems to mean so many different things to so many different people, it might be helpful first to define the land use problem in today's context.

Land use has come to mean something more than the narrow technical definition it has had for so many years. The issue is a part—probably the most significant part—of what has come to be called the "growth issue." In the past, growth has been viewed as an unalloyed blessing . . . the more, the better. Now, many people in the United States are questioning that proposition, or at least, embracing it with something less than their customary vigor. Central to their concerns about growth is how the land will be used and what effects will occur from those uses. More specifically, they are frustrated with our present system of controlling land development. It is this latter aspect—the *control* of land use—that we will look at today. From many points of view, but particularly that of professional biologists concerned with the future of our wildlife, the control of land use is central to an environment worth living in.

Rather than hang a proliferation of caveats of "on the other hand" onto every statement that follows, let me make them now. Obviously, every type of development does not necessarily cause serious environmental problems. Given the huge number of new families that will be formed in the next twenty-five years from our present population, a lot of new housing will have to be built to give them shelter. Over 27,000 new households *per week* are expected from now until 1985. And houses and all the additional development needed to serve those families cannot be built without displacing some piece of the natural environment. Nor is every developer greedy, or every local government inadequate to the task of seeing the public welfare accurately when confronted with the pressure of development.

It is the excesses we are concerned about. In the past they have been rather serious, and they will only become more serious as the scale and speed of modern development increases and accelerates. They are serious enough for us to be concerned about changing the ways we deal with development.

Until recently, it was generally accepted that the only way to protect the land was to buy it. Certainly that has been the practice, witness the countless wildlife refuges and bird sanctuaries that have come about through private philanthropy and government funding. For many reasons, among them the need for absolute public control and management and the need to accommodate increas-

ing public use of such areas as refuges and parks, much additional land will have to be publicly purchased. But if there is a message in this afternoon's session, it is that a significant amount of land can be protected and development adequately managed through the modernization (if that is a fair term for it) and innovative use of land use controls.

There is not enough tax money to buy all that land, particularly as speculative increases in value continue their seemingly endless climb. Nor is it necessary to do so. Most of the better state wetland laws regulate use in private marshland, because the protection of these important ecosystems is not necessarily incompatible with private ownership . . . and regulating such areas is far cheaper than buying them. For all the success stories of wildlife saved through public acquisition of habitat, there are far more tragic tales of needless wetland draining and other habitat destruction which occurred because there was not the money in the local, state, or federal treasuries to buy them, nor the boldness to regulate their use.

Although today's panel will address the more narrow question of protecting critical areas, such as habitat, it is worth the time to stop and look at this question of land use first in a broad sense, if only because it may help us later to better understand where habitat protection fits into the broader picture of land use reform. And if only because there are still a great number of people who are not convinced that land use is in fact a problem, at least one serious enough to warrant the kind of legislation they now see cropping up in their state legislatures.

If you were to squeeze into a computer most of the complaints that people have about what is happening to their surroundings, and push the print-out button, the message would probably be, "I don't like what I see . . . I don't like what I see . . . I don't like . . .," and so on. To paraphrase Geraldine, what you see is usually what gets you. I give prominence here to aesthetics because it is usually so poorly, or timidly, defended as a fundamental and legitimate objection that people have about what is happening to their surroundings. Stripped bare, that is what most of the major conservation battles in this country have been about. Without wishing to overreach with a hypothetical case, suppose that a huge deposit of copper were discovered throughout Mt. Hood and that a large mining consortium was preparing to reduce that mountain to an open pit. Not knowing much about that area and whether some copper company might know something I do not, the debate (that's a mild word for what would erupt) would probably center around such issues as siltation, loss of habitat, interference with skiing, and so on. But I strongly suspect that the votes in Portland, and probably the rest of Oregon and the country, to whom Mt. Hood is treasured as simply a stunningly beautiful mountain, would be based, primarily, on one overriding fact. It is a stunningly beautiful mountain. Despite all the logical arguments about the need for copper and the fact that our survival does not hinge on the view (even from a postcard) of Mt. Hood, it is doubtful that copper and survival would win the day. An ophthalmologist is not needed to argue the value of eyesight.

The ecological effects of improper land use are less obvious, at least they are to the untrained eye. Silted streams, drained bottom land, filled marsh, and plowed cover—the list is all too familiar to you, and it is added to with alarming speed.

Every professional can “read” his subject unlike others can. A good trial lawyer can spot a hostile potential juror before he ever asks his first question. A good waterfowl biologist can tell when the pintails are getting ready to migrate south from Canada. And a good politician never fails to anticipate the “bread and butter” sentiment of his constituency. Most elected office holders who felt the first stirrings of The Great Tax Revolt before it boiled over are still in office. Many of those who did not are not. No small part of the current grumbling (in many places it is louder than grumbling) about increased taxes is the complaint about paying for costly development that once was allowed to be touted unchallenged as an economic tonic to every community.

In community after community those costs are now being felt, as local governments attempt by higher assessments and tax rates to recoup the revenues they have lost trying to serve the seemingly never-ending spread of housing subdivisions with longer (and larger) sewer lines, improved roads, more schools, and police and fire protection. Many citizens are now pressing their local officials to end their long-running love affair with the developers or face serious opposition at the polls. The result is a growing number of sewer and subdivision moratoriums, building unit ceilings, and other attempts to limit development. Not all this anti-growth sentiment springs from indignation over increased taxes, although much of it does. With many, it is just the prospect of having “too many more people around here.” But like typical rezoning battles, the professed objections to the costs of growth often muffle less audibly stated objections . . . like what *kind* of people will be moving into those homes.

This brings us to the squirmiest effect of our land use practices, particularly in the suburbs: keeping certain people out. “Snob” zoning it is called in certain circles. Make the lots big enough, and exclude apartments (or limit the number of bedrooms of the few allowed in), and a community can effectively price housing lots high enough to keep out many families earning a moderate income, including the families of the local police who presumably are to make the community safe from those kept out. Certainly not all forms of exclusion are intentional. High interest rates, increasing housing construction costs, and the lack of profit in the building and sale of low and moderate income housing all combine to put housing out of the reach of many. But intentional exclusion, most often justified on grounds of protecting the “character” of this or that neighborhood, is all too common. It happens in many rural areas, particularly those sought after for “gentleman” farms. The only housing many poorer families can then turn to are trailers, the blackest of all black sheep in exclusionary zoning.

These then are some of the major effects of land misuse in the United States. They have been brought about by a combination of causes so inextricably entwined and resistant to change as to dampen the zeal of even the most ardent advocate of reform: our attitudes about land, the economics of holding on to it, and the government institutions responsible for managing it.

Land is wealth, or it holds the promise of producing wealth. Since the first colony on the east coast, Americans have regarded land as a financial investment. Except for a few, most of us are speculators at heart, and given the opportunity and money, particularly in these uncertain times when the rate of inflation is at an almost record high, we would invest in land.

Even farmers and ranchers—those tied most directly to the land for their

income—are hard put to resist the temptation to sell outright to a developer, or, at a minimum, strip off some road frontage and sell the subdivided lots for twenty times the value of the land as cropping soil. Most farmers do not want to lose their land. Farming has been their life. Their family, their society, all are tied to farming. But, except for an exceptional year like 1973, prices for livestock and crops hardly keep up, if they even do that, with the increasing costs of labor, fertilizer, feed, and particularly, machinery. Add to this the physical strain and the threat of calamitous weather which are the lot of farming and ranching, and it is a wonder that so many are able to withstand the pressures to sell out when land values start soaring, again cutting off their opportunity to expand acreage and make up in volume what cannot be made up in prices.

Tax policy is another significant element in the economics of land conversion. Space is too brief here to catalogue the various provisions of the Internal Revenue Code which inadvertently, and sometimes advertently, encourage unsound land use practices (and I would have to add that the experts are hardly in agreement on the degree to which tax policies influence inappropriate land use). But a few generalizations can be made. Depreciation rules and the treatment of demolition costs together help encourage the continued destruction, rather than the restoration, of old and often historic buildings in our cities. Numerous scenic ranches and farms, which have been in continuous ownership for generations, are sold for development to raise the cash for estate taxes. Speculators are encouraged by the more favorable capital gains tax rate to prematurely subdivide beautiful countryside, gouge out primitive dirt roads, and sell off what are often almost worthless lots to gullible buyers, rather than investing in more productive and less damaging enterprises.

And then there is the property tax, the umbilical cord of local government. Until recent anti-growth phenomena, most local officials were all too willing to accept any new development in the hopes that the resulting property tax revenues would help bring progress to River City.

The inflated vision of vast tax revenues has helped undercut the effectiveness of local public land use controls, principally zoning and subdivision ordinances. So have the irresistible pressures to rezone for more intense development, which can increase the value of a piece of land overnight by hundreds of thousands of dollars. Partly in an effort to secure the political control of these money-making regulatory devices (the broader public accountability for which state governments had long ago withdrawn the hem of their garments), minor subdivisions, particularly since World War II, have incorporated in small sizes and usually bewildering numbers, so that many metropolitan areas have become an unmanageable patchwork of hundreds of autonomous fiefdoms. Complemented by Americans' traditional resistance to public controls over the use of their land, and an unshakable faith that what does not affect us directly does not affect us at all, the consequences of exclusive local control have often been chaotic. Major development decisions affecting an entire state or region have been made by small, local communities, in too many instances governed by officials closely associated with the development interests, and at a minimum concerning themselves only with local consequences.

But the public regulation of private development has not been the only failing of our system of land use management. The strongest stimulants to the

development of land are what the government constructs or causes to be constructed, that is, public works. Yet all levels of government, most particularly the Federal Government (at least until the passage of the National Environmental Policy Act) have usually been free to ignore the secondary impacts of such land use determinants as highways, airports, and sewer and water lines. One dramatic example of the federal influence on land use is the Tocks Island Reservoir project of the U.S. Army Corps of Engineers on the Delaware River. Without an ounce of concrete having been poured, the recreation potential of the proposed reservoir has helped fuel a premature subdivision boom and lot sale fever that is threatening to leave the Poconos of eastern Pennsylvania a rutted and mangled landscape for many generations.

That, in something more than a nutshell, is the land use problem. Unfortunately, it will probably be with us long after pollution is under control and our energy supplies and demand are in better balance.

But there are some hopeful signs that the process by which land use decisions get made is undergoing a long needed overhaul. As indicated earlier, many local communities are showing a new skepticism about development at any cost. A number of states have recently enacted land use legislation to reassert a legitimate regional interest in how development is controlled and important lands protected.

At the federal level, legislation has passed the Senate and has been reported out by the House Interior and Insular Affairs Committee which would provide federal funds to encourage states to enact comprehensive land use legislation to help better balance state and local responsibilities for public decisions affecting land use. Without getting into exhaustive detail about the two particular bills in question, the general outline of the proposed national land use legislation before Congress is to urge the states to control areas of "critical environmental concern," to control the siting of and development around major highways, airports, and recreation areas, to control any development which is of "large scale" (a general definition of the factors to take into account in determining what is "large scale" is contained in the bills), and to assure that developments which are regionally needed (such as waste treatment plants and low cost housing) are not arbitrarily excluded by local government. The states are encouraged to use local governments for the implementation of such controls, but the states are required to retain ultimate veto authority. Major federal activities which affect land use must thereafter conform to a state's land use program once approved by the Secretary of the Interior.

None of this legislative activity will necessarily make the conflicts over land use less acrimonious, for these conflicts are inherent in any society, particularly one as dynamic as the United States. Maybe, hopefully, the process will become more conducive to intelligent choice.

## **Discussion**

**DISCUSSION LEADER BOSSELMAN:** Boyd was much too modest in describing his own career in the government. Many of you may be aware that he was Deputy Under Secretary of Interior for about two years and for about three years was Executive Secretary of the Council on Environmental Quality. In those roles he was very closely involved in the drafting of legislation, such as the Coastal Management Act, which passed recently and is now getting under way.

He was also closely involved in drafting the National Land Use Policy legislation, a variation of which passed the Senate last year and is before the House Rules Committee.

I would like to present the first question to Boyd. One of the major issues and one of particular concern to wildlife management people is the correlation between the Coastal Zone Management Program which is administered by the Department of Commerce and the Land Use Policy Program that is going to be administered by the Department of the Interior.

Based on your experience, do you believe that this is going to work out?

Do you think it makes a rational difference to say one agency shall administer a land use program for the coastal zone and one for the rest of the nation? If so, how do you see a dividing line?

CHAIRMAN GIBBONS: I will say, "no," I don't think it is a rational division.

First, let me give you a quick background. The Coastal Zone legislation grew as a result of a major report on ocean problems by the Federal Government. Russell Train, who was my boss in the Department of the Interior, was interested in pushing for stronger controls of the coast line, namely coastal zone legislation. However, he saw it, as we all did when working on it, as a problem of land and water use which, whatever you want to call it, involved regulatory controls of submerged land.

That legislation went to Congress and about a year later it became apparent that there was an opportunity to deal with land use in a broader context. Unfortunately, having unleashed the Coastal Zone Act, we found ourselves having to say that we really did not want two acts because that means that Commerce will administer a Coastal Zone Act, which essentially has the same purposes as another, although broader, bill—the land use bill—to be administered by Interior.

Both essentially do the same thing—resolve conflicts between development and conservation by the exercise of regulatory controls over development. The battle took place on the Hill between competing committees that wanted a piece of this action, of course, and agencies of the Departments of the Interior and Commerce who wanted theirs.

The position of the Administration was that there ought to be one piece of legislation. However, eventually some fairly strong Senators and Congressmen got the coastal zone legislation passed and it is now law.

The Land Use Bill, however, is not law but it is rapidly approaching that. Ultimately both can be administered at the federal level sufficiently well to avoid conflicts of agencies. I am not too sanguine, however, to believe that this always will work smoothly because federal agencies, as any other government agencies, have a tendency to compete rather than cooperate. Yet, to date, both NOAA and Interior have cooperated well.

MR. FRASER: I would like to take issue with that and say that the Coastal Zone Region of the United States has 50 percent of the population today and is projected to have some 80 percent of the population growth and new buildings in the future.

The Coastal Zone Management Act was underfunded by the Administration. However, they have finally, as a result of enormous pressure from Congress, released the funds that Congress appropriated. The Coastal Zone Land Use Management Controls are now getting funded so that the Coastal and Great Lakes States can begin to tackle their toughest problems.

Land use control is an enormously volatile sort of issue. Those of you who attended public hearings on this might come to the conclusion that the Chinese Communists were involved. They were really slugging it out. Further, as a nation, we will be lucky if we learn to conduct ourselves in a civil fashion over the next five years, especially in relation to coastal zone issues.

For example, you have the issues of oil refineries, of dredging, of commerce, of atomic power plants, recreational communities and the like. It is going to be a hot subject and I have little patience with the foot-dragging of the Administration on the funds that Congress has appropriated.

There was a national conference about two weeks ago, at which some forty states were represented. People were coming to grips with some very tough and very real problems. It is going to be a long learning period. There is going to be a lot of blood shed, but at the end of ten years we may have some rational approach to dealing with problems on the coast.

Therefore, I am happy to see that the Coastal Zone Management Act is enforced, that

funds are finally being cut loose, and that the state agencies are getting underway with it.

CHAIRMAN GIBBONS: I agree with what Charley said about the seriousness of the coastal issue.

Our original concern with the consequences of the legislation was that, if it produced competing state agencies, it would present some serious problems of administering a system of controls at the state level.

I return to the essential problem of land use in relationship to these federal acts—namely that they represent real political issues between state and local government prerogatives and no amount of money from Washington will purchase the solutions. We will get back later to the question of sanctions.

MR. FRED FERD [Mississippi]: Mr. Gibbons, you said in your definition of state land use problems that the best land use is what you see. I would heartily disagree with this. The best land use is determined by what purpose the parcel of land can best be used for.

For instance, marshland, meadows, and swamps can be used for wildlife sanctuaries, wild bird breeding areas, nursery areas for marine and aquatic species and upland species. These are the types of lands that are more fertile for the raising of natural resources.

I think you failed to bring that out in your speech.

CHAIRMAN GIBBONS: I did not say that the best land use is what you see—I said that the concerns of most people about land use were visual concerns. I was not saying, for example, that the best land use is how you perceive it with your eyes but I was saying I think it is how most people perceive the issues.

John Ingle is young but very experienced in the field of land controls for he is the Assistant Attorney General for the State of Florida with direct responsibility of Cabinet Affairs which, in the State of Florida, includes the executive management of most of their major public agencies, including the environmental agencies.

This, in turn, directly involves him in environmental issues and particularly in the administration of Florida's land use law.

He will deal with the problems of the Florida Land and Water Management Act and how it relates to the concern of protecting critical areas.





## **Protecting Critical Environmental Areas—A Panel**

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# **Florida's Approach to Protecting Critical Environmental Areas**

**John P. Ingle, III**

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### **Introduction**

I wish that I could address you today on the subject of "Florida's *Successes* in Protecting Critical Environmental Areas." However, an address on that topic would amount to verbalization of a shrug of the shoulders. Our successes are few and ambiguous, but there is enough potential to give a basis for some hope. We have some good environmental experts working for the state, but they are divided between six squabbling agencies, all suffering from appropriations anemia. We have some fine organizations and environmental interest groups, which unfortunately also squabble and have difficulty speaking with one clear, persuasive voice on important issues. We have some fine elected public officials with the public interest at heart, who unfortunately sometimes are in a minority when votes are taken.

So far I have been describing each of your home states. Now I will attempt to give an overview of Florida's problems, its piece-meal approaches, and its new semi-systematic approach. Then I will skim over how well things are working, and end on a note of hope for the future.

### **Florida's Problems**

Florida's number one blessing and curse is its package of natural resources. Its salubrious climate and sundrenched beaches are well known. It has the longest coastline of any state in the continental United States. It has over 30,000 named lakes. Seventeen of this country's 65 first magnitude springs are located in Florida. Commercial and sports fishing are unexcelled. Not counting exotic fauna such as Mickey Mouse and the Miami Dolphins, we are the year-round home for thousands of alligators, plus a few deer, black bears, and panthers. Millions of migratory birds spend the winter with us. We are one of the few states with a significant population of American bald eagles. Rare orchids and thousand-year-old cypress trees grow wild in our few remaining virgin wildernesses.

All of these natural resources, unfortunately, serve as magnets for our

number two blessing and curse—growth. Not counting our 25 million annual tourists and streakers, Florida gains about 1,000 new residents every day of the year. All of these people require land to live and play on, air to breathe, and water to drink. The demand curve is rapidly approaching the supply baseline. An incalculable but significant portion of our natural resources has been bulldozed, dredged, filled, drained, channelized, pumped, paved and terraformed to accommodate this explosive growth. Further aggravating the situation, the growth has been unevenly distributed. Seventy percent of our 7½ million people live on 14 percent of our land area clustered along our Atlantic and Gulf Coasts.

This concentration inevitably results in the degradation and destruction of highly productive estuarine areas so vital in the life cycles of commercial and sports fisheries species. Clustering along the coast also leads to taking so much fresh water from our sponge-like aquifer that salt-water intrusion and contamination have become serious problems. Agricultural fertilizer and pesticide runoffs contribute their share, along with urban runoff and industrial and sewage effluent. The fuel crisis evidently has not yet hit the owners of dune buggies, swamp buggies, and trail motorcycles, since their destructive rampages and deafening roars continue to disturb nature lovers and wildlife alike.

The consequences of ignoring ecological considerations are everywhere. Destruction of dune systems hastens erosion and aggravates storm damage. Building in flood plains leads to wet, homeless refugees. Stripping, paving over, and otherwise urbanizing aquifer recharge areas leads to diminished and polluted water supply, especially where septic tanks are utilized. Drainage permanently alters the characteristics of fragile wetlands areas.

### **Piecemeal Approaches**

Like most states, Florida has a conglomeration of legal techniques which have grown up over the years as officials have attempted to cope with these problems. I do not mean to sell these approaches short; disjointed and symptom-treating though they are, they have afforded a measure of protection in the past and will still have a valuable role in the future. In no particular order they are:

Chapter 161, Florida Statutes, provides a mechanism for establishing a coastal construction setback line on all private property along our coast. Pending detailed studies for a specific setback line tailored to a particular region, there is a minimal setback of fifty feet landward of the line of mean high water. A noble concept, but the detailed studies are proceeding far too slowly for my satisfaction.

Chapter 253, Florida Statutes, provides a mechanism for management of state-owned lands, including sovereign lands beneath mean high water. Permits are required for most dredge and fill operations, bulkhead and seawall construction, and docks and piers in navigable waters. Full biological field reports are required before permits are granted, and many permits are denied or approved with stipulations because of adverse reports by environmental agencies. One of the major drawbacks of this approach to environmental protection is the difficult and costly process of determining exactly where the line of mean high water is—or was in 1845 when Florida became a state. In some parts of

Florida, the land is so flat that a vertical difference of one inch in the mean high water line can make a difference of a mile in horizontal measurement.

Chapter 376, Florida Statutes, is the Oil Spill Act, recently upheld by the U.S. Supreme Court, providing automatic and unlimited liability for the costs of cleaning up an oil spill. The law is now under attack in our legislature, where a major effort to weaken it is expected under the banner of the "energy crisis."

Chapter 403, Florida Statutes, is our Pollution Control law. The setting of air and water quality standards has a major impact on development in many ways, as you are no doubt aware from the experience of your home states.

There is an Electrical Power Plant Siting Act, establishing a one-step permitting procedure for new power plants, with state participation in the site selection process.

There are also laws setting up systems of state parks, wilderness preserves, state forests, aquatic preserves, water storage areas, and wildlife management areas. The people of Florida in 1972 approved a \$240 million bond issue for the purchase of environmentally endangered and recreation lands. Unfortunately, the legislature has not seen fit to grant the use of the power of eminent domain for acquisition of these lands.

### **A Systematic Approach**

A more systematic approach to protection of critical environmental areas in Florida was made possible by the enactment in 1972 of the Environmental Land and Water Management act, Chapter 380, Florida Statutes. This law, patterned approximately after the American Law Institute-American Bar Association Model Land Use Code, was the first of its kind in the country, and provides what I think is the best hope yet for dealing with land use problems before they become locked into concrete and stucco.

The basic philosophy of the Act reflects the realization that traditionally, virtually all governmental decisions regarding land use control have been made at the local level, by city and county governments. They have done so because they were delegated that power by the state, and the state was not interested in intervening in matters thought to be of purely local concern. The Act recognizes that while this is largely still true, there are some land use decisions that have an impact beyond the local government's boundaries, and impact either upon statewide interests or the interests of neighboring local governments. In these few instances, and we are probably talking about one percent of the total number of local land use decisions, state intervention is to some degree possible.

The mechanisms of the Act are fairly complex, partly because Fred Bosselman's Model Land Use Code is complex, partly because the Act is the product of compromises and amendments in the legislative process, and partly because we lawyers couldn't make a living if everything were simple. A few basic definitions first: The word "development" is defined very broadly as the carrying out of any building or mining operation or the making of any material change in the use or appearance of any structure or land and the dividing of land into three or more parcels. The Act takes half a page to describe what is included in "development," and also lists some unfortunate exclusions, which I will discuss later. A "development permit" includes any building permit, zoning

permit, plat approval, rezoning, certification, variance, or any other action having the effect of permitting "development" as defined.

The three major operating sections of the Act are the Developments of Regional Impact section, the Areas of Critical State Concern section, and the appeals section. A "development of regional impact" is any development which, because of its character, magnitude, or location, would have a substantial effect on the health, safety, or welfare of citizens of more than one county. This definition was made more specific by rulemaking which spelled out twelve types of development and set numerical size standards as thresholds to use in determining whether they were of regional impact. Included are airports, hospitals of over 600 beds, attractions and recreational facilities, mining operations, shopping centers, and others. Residential developments are included with a variable dwelling unit threshold depending on the population of the county.

If a developer wants to carry out a development of regional impact, he goes to the local government involved. They tell him that he is a "DRI" and give him a massive application form to fill out. He faints. When he revives, he goes out, gets another loan, and hires a battalion of planners, engineers, architects, wildlife ecologists, and lawyers, who labor to gather the data required. The completed application is delivered to the local government, which sets a hearing date and publishes notice thereof in the local paper, calling attention to the fact that it is a DRI. In the meantime, the local government gives the completed application and exhibits to a regional planning agency, which prepares and submits to the local government a report and recommendations on the regional impact of the proposed development. This report assesses not only the environmental impact of the proposed DRI, but also its impact on the region's economy, water and sewer facilities, transportation systems, housing, and governmental services such as fire, police, and schools.

The local government holds its public hearing on the DRI, and, in making its decision, is required to take into account, but not necessarily to follow, the report and recommendations of the regional planning agency, as well as the state land development plan if one has been adopted (none has yet). Once the decision is made by the local government to approve, approve with conditions, or deny the development permit, the decision can be appealed by the developer or the regional planning agency. I will go into appeals shortly.

That is the DRI process in a capsule. The salient features are local decision-making illuminated by public hearing, and informed by the regional report on the impact of the development beyond the local government's boundaries.

As opposed to the DRI process, which focuses on the size of a development no matter where in the state it occurs, the Area of Critical State Concern mechanism focuses on a specific geographic area which is sensitive enough for one reason or another to warrant state intervention in local land use regulation. An area of critical state concern might be an area containing, or having a significant impact on, environmental, historical, natural, or archaeological resources of regional or statewide importance. Alternatively, it might be an area affected by or affecting an existing or proposed major public facility or public investment. Finally, it could be a proposed area of major development potential, such as the site of a proposed new town.

Regional planning agencies and others nominate proposed areas of critical state concern to the division of state planning, which may then recommend to the Governor and Cabinet that an area be designated as of critical state concern. The recommendation for designation specifies why the area is of critical concern, the dangers of uncontrolled development in the area, and benefits that would accrue from coordinated development of the area. Following notice and hearing, the Governor and Cabinet may designate the critical area and by rule specify the principles to guide development in the area.

Once the critical area has been designated, the local governments having jurisdiction are given six months within which to develop land development regulations and ordinances consistent with the principles for guiding development set forth in the rule designating the critical area. If the six months go by with no satisfactory local regulations, the Governor and Cabinet adopt some, which are then implemented and enforced by the local government. Any future change in the local regulations in a critical area must be approved by the Division of State Planning. Any local government order granting or denying a development order in a critical area may be appealed to the Governor and Cabinet by the developer, the regional planning agency, or the Division of State Planning.

The appeals procedure from a development order in a critical area or involving a DRI is a fairly standard due process thing. The filing of a notice of appeal stops the effectiveness of the order appealed from. Interested parties may intervene. For instance, in one of our DRI appeals pending now, the county next door to the DRI has moved to intervene. The Governor and Cabinet, sitting as the Land and Water Adjudicatory Commission, appoint a hearing examiner, who takes testimony under oath and makes a report back. The Governor and Cabinet make the final decision. If you don't like that, then you can go to court.

### **Actual Experience**

Considering institutional limitations, the Environmental Land and Water Management Act is working fairly well. Some of the limitations are: The Act exempts all agricultural activities from any regulation. This is a gaping loophole, as the destruction of the Everglades by draining and farming illustrates. The Area of Critical State Concern treatment may not be applied to more than five percent of the total land area of the state. There is no provision for an immediate moratorium on development activities as soon as a critical area is designated. The DRI process does not take effect unless a county has some zoning or subdivision regulations, and over a third of Florida's counties do not.

Another type of limitation is the lack of personnel and funding for the agencies charged with responsibilities under the Act. The bureau of the Division of State Planning which implements the Act had only five professionals a year ago, and has only eight today—four for DRIs and four for critical areas. This is just woefully inadequate. There has not been, in the twenty-one months the Act has been in effect, a single area of critical state concern designated the way the Act intended. Our only critical area, the Big Cypress Swamp north and west of the Everglades National Park, was so designated by the Legislature last year.

An enormous amount of research, field study, and coordination is required in working up a critical area report. Two areas got very close to designation but local governments made enough strides toward solving their own problems that critical area designation was put on the back burner. In fact, that is one of the advantages of the process: The likelihood of state intervention spurs local governments into doing something about previously ignored problems. Sixty-nine nominations of potential critical areas have been received. One is at the public hearing stage (the Green Swamp) and another three or four are bubbling along.

The DRI process is working fairly well. 73 DRIs were proposed during the last 6 months of 1973. Four were denied, eight approved, eleven approved with conditions, and the rest are in limbo. Three appeals from DRI's are pending. Although not measurable, there is a general feeling that the DRI review process has resulted in a better, more informed quality of decision-making by local governments.

### **Hope for the Future**

If the Act isn't repealed or weakened, if adequate funding is provided for state and regional agencies involved, if we can get a law protecting wetlands, if we can develop a statewide natural resources inventory and land use plan, if a coordinated growth policy for the state is adopted, and if the laws are effectively enforced, then Florida stands a fighting chance of making it to the year 2000 without becoming a wall-to-wall Los Angeles (or Miami Beach).

We need help. We need public support. We need developers who genuinely want to build livable developments, compatible with the surrounding environments. We need the time and expertise of you environmental and wildlife experts in identifying and solving our problems.

I would like to leave you with two thoughts. First, it all hangs together. You can't talk about protecting wildlife without also talking about controlling land use and stopping pollution. Second, the best laws in the world are only half the battle. You've got to staff, finance, and support the agencies who enforce them.

### **Discussion**

MR. THREINEN [Wisconsin]: Would one be better off with an extensive use of police power or with a strong land acquisition program?

MR. INGLE: In Florida, people are told in glaring red type in the disclosure statements required by our Land Sales Act, that the land they are about to buy is under water eleven months of the year, is inaccessible, there is no guarantee it can ever be developed, and probably is useless—people who read those statements in a disclosure statement are nevertheless willing to pay \$2,000 or \$3,000 an acre.

There are, for example, some environmentally sensitive lands we just purchased on Honeymoon Island in Florida, and we paid \$75,000 an acre for about 300 acres. Therefore, I just don't think there is enough money in the State Treasury or anybody's treasury to buy all of the land that is environmentally endangered.

The only way you can look at it is as a mixture on a sliding scale.

For example, land that is perfectly developable, you hardly regulate at all; land that no development can take place on, you buy and, on anything in between, you use a variable amount of state regulation to limit the uses to which the land can be put.

You know, it is possible to rather severely restrict the use of land without restricting it so much that no use is possible and thus you have to buy it.

MR. FRASER: Our company just purchased some lands for \$3500 an acre and at the

time, all of the other landowners were saying "if Fraser sells, we will sell also."

Today, for some of this land, they are asking as much as \$60,000 an acre. Of course, Congress is unwilling to appropriate these sorts of funds.

Now, by way of illustration, if Congress had spent the same amount of money they spent on building the Sam Rayburn Office Building, they could have bought every single major island that has been developed on the entire Atlantic Coast. Therefore, even today, the largest and finest island on the Coast that is still in private hands was just purchased for approximately 8 percent of what was invested in the Rayburn Office Building. Therefore, if you get there early enough, you can purchase it. However, once development starts in the area, the costs get out of hand and then you have to use the police and regulatory powers and these are becoming increasingly effective.

MR. KLESSIG [Wisconsin]: Would you comment a little more on the ownership of Florida lands.

MR. INGLE: In relation to dry land ownership, I believe that about five percent of Florida's Coastal Zone is in public ownership—federal, state, county, city. All the rest is in private ownership and can be developed unless, of course, state regulation prohibits it.

I would like to point out, however, that Florida is so naturally wet that in order to develop a lot of land in Florida you have to dredge and fill or drain and the state does have a handle on that type of activity.

CHAIRMAN GIBBONS: Our next panelist is a developer. He has been described as a visionary who, when he was young, told his mother to the effect—"I might never make any money but I hope to create something beautiful."

Now, having never visited his developments but having seen pictures of them and talking to those who have, I gather he has certainly done the latter and I also suspect he hasn't done too badly in the former.

Charles Fraser is one of the best known, if not one of the more respected developers in the country. He has put together the Sea Pines Company and proceeded with a development known as Sea Pines Plantation on Hilton Head Island in South Carolina. With that, I will leave it up to Charles Fraser to fill in the rest.

# The Developer's Role in Preserving Wildlife Habitats

Charles E. Fraser

*President, Sea Pines Company, Hilton Head Island, South Carolina*

One hundred years ago, Henry David Thoreau lamented that his beloved Concord had been excessively tamed by the community's growth:

When I consider that the nobler animals have been exterminated here—the cougar, the panther, lynx, wolverine, wolf, bear, moose, the deer, the beaver, and the turkey, etc.—I cannot but feel as if I live in a tame, and as it were, emasculated country . . . I take infinite pains to know all the phenomena (of the wilderness). . . and then to my chagrin, I learn that . . . my ancestors have . . . mutilated it . . .

It is likely that, because of scientific management, fewer animals and plants have completely disappeared since Thoreau's time than during the century which preceded him. Yet with the development of America's metropolitan centers, wildlife habitats have been drastically mutilated.

Thoreau once asked the village parson to sound the knell whenever a tree was cut down. The trees have continued to fall, but any bell which is rung is less likely to be a mournful knell than a celebration of "progress." But we Americans are rapidly learning that "progress," "growth," and "development"—the traditional synonyms for our history—no longer can go unexamined.

Mindful of the impact of the axe and the plow on Walden, today's environmental ethic demands preservation of the wilderness. But 27,000 families each week require new housing; and thousands more seek refuge at the coast, in the mountains, or by other wildlife sanctuaries. It is the responsible developer's role, consequently, to accommodate these seemingly conflicting needs.

The Sea Pines Company plans, builds, and operates resorts, recreation facilities, and new communities. Since its founding in 1957, Sea Pines has endeavored to demonstrate that proper use of our land and water resources is in the interest of both man and wildlife, that our citizens need not lose their natural sense of adventure, and that the perspectives of wildlife manager and community developer need not be opposed.

We are currently involved in more than ten projects in the Southeast and Puerto Rico, including destination resorts, secondary and primary home communities, a private sector equivalent of a mountain national park, and unique Sportsgarden leisure worlds. Our business, therefore, is in the land development, resort, and recreation industries. In each of these, the diversity and condition of wildlife populations serve as a barometer of the quality of environment for man.

A visit to Sea Pines Plantation, a 5,400-acre resort community on Hilton Head Island, South Carolina, readily reveals the principal characteristics of our philosophy of responsible land use. Strict control of land use and building design is ensured through deed restrictions and covenants; and forests, parks



and open space are preserved in perpetuity. One quarter of Sea Pines Plantation has been set aside as green space to provide buffers between development zones and to maintain the Carolina "low country's" abundant wildlife habitats. Our principal north-south road is situated not along the coast, where it would disturb pristine beaches, but several hundred yards inland, with cul-de-sacs running down to beach-view housing clusters. A wide green strip of land with paths to the beach is located between each residential cul-de-sac.

All the amenities—nature and equestrian trails, tennis courts, bird observation decks, picnic areas, golf courses, and fishing ponds—have been situated with both land values *and* wildlife habitats in mind. Two square miles within the borders of the development have been set aside as a nature preserve, a million dollar dedication based on purchase price alone. The Company has made a fundamental commitment, not subject to change because of financial, aesthetic or any other pressures, to maintain this land as an undeveloped wildlife refuge, free of homes and other buildings, and managed consistently with sound conservation policies.

Throughout the Plantation, boardwalks provide picture windows for observation of herons, ibis, egrets, waterfowl, raccoons, and minks. Presently, on Hilton Head Island, there are thirty deer, sixty raccoons, more than one thousand squirrels, four hundred doves or quail, and twenty opossums per square mile. Rare alligators, hogs, and marsh rabbits are not uncommon; and bobcats and wild turkeys may be seen. The diversity of this environment reflects the success of our wildlife management efforts and is the key to pleasant community life for man.

The process that ensures this result is complex, painstaking and costly. It requires extensive research and field work in several sciences. In the past twenty-four months, we have spent more than one million dollars solely on environmental research and analysis for our new resort community projects in Florida and Puerto Rico. We recognize that little can be done to alter favorably the land's carrying capacity. But we can and do mitigate decimating factors, afford protection, and preserve sources of food, cover, and water.

The premise underlying our development process is that habitat changes in land use patterns have far more effect on wildlife population than does hunting. Thus, wildlife preservation depends upon maintenance and enhancement of the land's natural carrying capacity. "Succession," "edge effect," and "limiting factors" — terminology alien to most developers—are therefore essential to the formulation of our master land use plans, which seek to optimize the distribution and density of animal populations on the site.

The first stage in the evolution of these master plans is the determination of the land's intrinsic abilities and limitations. To conclude that a particular property is best suited for a villa, a golf fairway, or open space, we must first identify and interpret explicit natural phenomena which contribute to a balanced ecosystem. Soil characteristics, vegetation types, and wildlife habits are all integrated in this initial analysis. Although our first initial habitat investigations require supplementary study covering all seasons, the preliminary record of animal populations, their behavior, and their particular tolerances to man's presence charts a firm blueprint for development.

This master planning process can best be illustrated by a glimpse of the Sea

Pines Company's wildlife management efforts at Amelia Island, Florida, a barrier island twenty-five miles northeast of Jacksonville. In 1971, our Company contracted the internationally recognized firm of Wallace, McHarg, Roberts, and Todd to conduct an ecological planning and land use study for the 2,000 acres of ground which we had purchased from Union Carbide Corporation. With the assistance of Sea Pines' specialists, the Wallace-McHarg firm assembled a consultant team of some dozen natural scientists, acknowledged experts in ornithology, herpetology, and mammology, among other fields. Their investigations continued for a full calendar year. Meanwhile, Sea Pines contracted other firms to study water resources, soil profiles, cultural and archaeological characteristics. This environmental design team was further served by a *Board of Review*, comprised of nationally recognized experts in land planning and design who will continue to consult with the Company and review the project during its entire build-out.

Though risking inaccuracy by singling out one aspect of this sophisticated synergistic study, let me focus on the methodology of our consultant herpetologist. First, an overview of the herpetologic significance of Amelia Island was combined with a review of prior scientific work completed for this property and similar land. After summarizing the zoogeographic importance of the site and the animals' reproductive phenology, our consultant projected the probable impact of various habitat alterations. Finally, his recommendations included operations scheduling, plans for optimization of habitats in altered areas, regulations of dangerous populations, protection programs for rare or endangered species, and suggestions for continuing studies.

After each wildlife specialist submitted his report, a composite map was prepared to present graphically a general idea of the potential distribution of animal populations. From this, we undertook to define the *ecotones*, which provide wildlife refuge cover, travel corridors, nesting sites, and productive food sources.

By correlating this wildlife habitat study with other interpretive maps, it was possible to construct the elements of a social value system. The environmental factors relevant to the suitable location of each prospective land use was then assembled graphically and superimposed as transparent maps. From this display, we could determine the maximum coincidence of all positive factors and the fewest constraints on the location of all the land uses in our development program. This document, consequently, was the principal guide for our response to market considerations.

Master planning, however, was only a first step in our development process at Amelia Island Plantation. Proper water management is essential to preserving wildlife habitats. Amphibians, reptiles and wading birds need permanent fresh water, so low sills or water control devices were necessary to preserve the swamp wildlife's environment. Since salt marshes are the base in the regeneration and exportation of nutrients to marine and terrestrial food chains, our construction crews have been careful not to disturb smooth cordgrass and mud algae. In this way, we seek to minimize the impact of development on shrimp, crab, and oyster nurseries.

Tall pine trees, palmettos and their berries, and live oaks, their cones and acorns are residential amenities in themselves; but without them, it is nearly

impossible to maintain wildlife in the Southeast. A \$1,000 fine is therefore imposed on contractors or clearing crews if a marked tree is destroyed or significantly damaged. We require homebuilders, before construction, to submit a plan showing how the house is designed to minimize the cutting of mature trees. Before cutting any remaining tree whose trunk exceeds six inches in diameter, the homeowner must first obtain permission from the Company's Architectural Review Board.

Although wildlife abound on Amelia Island Plantation and throughout each of our communities, some species, like wild turkey, require wild areas relatively remote from civilization. This need is satisfied by our forest preserves. At Palmas del Mar, in Puerto Rico, for example, to provide escape routes for larger animals, hiking and bridle trails are placed around the perimeter of the preserve. Marshlands with tiny islands provide refuge for smaller animals. Wooden walkways lead in, but not to the heart of rookeries, and one side is kept inviolate.

These efforts are coupled with the restriction of hunting, reduction in the number of free-ranging dogs and cats, and careful use of pesticides and fertilizers governed by our in-house agronomist and entomologist. In this way, at Amelia Island Plantation, thirty species of mammals, 135 kinds of birds, fish, and other wildlife will share natural community life with our residents and resort guests.

The Wallace, McHarg study delayed development of the property for more than one year, while interest accrued on our debt. This study itself cost \$300,000. But we have no regrets.

Our care for the environment is neither frivolous nor philanthropic. It is neither a public relations strategy nor an investment against government control. The Sea Pines Company might be selling homesites or condominiums, renting hotel rooms or campsites, or packaging tennis or golf programs; but *our real product is the environment.*

Trees, marshes, breezes, views, beaches, birds, lakes, wildlife, clean water, and pure air are the essential determinants of our success. Not only the fish and wildlife profit from our saving swamp and salt marshes. Frontage on these significantly increase the value of homesites. The presence of deer, fox squirrels, raccoons, and osprey contribute as much to our land's value as any man-made amenity.

The importance of the natural environment in the Sea Pines' process is especially evident at our new project in southwestern North Carolina. On 6,500 acres of scenic mountain land within the Appalachians, including property along the Nantahala River and the 2,000 acre Nantahala Lake, we are planning the first of what we hope will be an entire system of privately owned national parks. In addition to providing the wide range of outdoor experiences characteristic of most state and national parks, Lake Nantahala Park will offer cabins and a variety of other rustic hard-roof units, which make the private sector national park concept economically feasible. In order to provide the visitor with the proper balance of park services and outdoor experiences, 75 percent of the property will remain in its natural state except for a system of hiking and equestrian trails.

Why is the preservation of the environment not the practice of more

developers? Costs, lack of expertise, the desire to "get out quickly" are all explanations. But a principal factor is today's faulty system of *accounting*. Its outmoded economic theory and archaic terminology discourage the developer from assuming a responsible role in the management of wildlife habitats. Perhaps this is a proper area of study for the Wildlife Management Institute.

You and I talk about "diminishing habitats" and "endangered species," but seldom do we attempt to articulate an economic theory underlying these terms. We are able to determine costs when the environment has been damaged, but we are unable to relate the natural, undegraded environment to dollars. Our economists and accountants have developed no practical way to represent in financial terms the real values which people attach to wildlife and the environment. Occasionally, economists acknowledge the value of wildlife and the environment; but even then, they receive condescending labels like "aesthetics" and do not appear on balance sheets in any relation to the social and market demand they represent. Given the financial world's neglect of environmental values, it is no wonder that the land development, recreation, and resort industries generally have failed to preserve wildlife habitats.

Our products, nevertheless, are directed to a market that in many ways understands the values of environmental concerns. From this economic perspective, wildlife is a colorful, distinctive, and valuable amenity. It is essential to the Sea Pines concept of a cherished place—a rare, balanced environment in whose creation, growth, and continuity our residents and visitors have participated and shared. We believe with Rene DuBos that

Without some awareness of nature and experience of its divine mysteries, man ceases to be a man. When the wind and the sea is no longer a part of the human spirit, a part of the very flesh and bone, man becomes a cosmic outlaw, having neither the completeness and integrity of the animal nor the birthright of true humanity.

At Sea Pines communities, Thoreau would be pleased to know, the bells which sound each day celebrate the awareness of nature and its divine mysteries.

## **Discussion**

CHAIRMAN GIBBONS: The slides we have seen are, to anybody who has driven anywhere in the United States, evidence of a rarity, that is, a sensitive type of development. There are far too many builders who are ruining vast amounts of the landscape.

Now, other than the fact that it might help you with the competition, could you, as a developer, say what you see a state having to do, specifically to eliminate the black hats, and encourage more sensitive development?

MR. FRASER: The passing of the Interstate Land Sales Act and several other Acts have most of the black hat companies running for cover. I call them the "dirty dirt peddlers." But the largest despoilers are really on the run. However, there are still remaining those little despoilers who nibble away in little pieces and they attract little attention.

Therefore, I would specifically recommend that in each county in the United States, pressures be brought to bear on the county supervisors to establish and announce policy for the various regions of the county as to amount of open space they will require a developer, whether he has fifty lots or 5,000 lots, to save and that there be a process under which he would be forced to purchase part of a county park or a large wildlife area in order to develop 100 percent of his area.

For example, if it fell in a region where 10 percent of the land was to be set aside as permanent open space, and if the development were too small to have its own park in

relation to that ten percent, then that ten percent, in effect, in equivalent dollars would be applied to a larger park or wildlife refuge in that county. Therefore, by articulating the standards for open space for various sections of the county under which any new development will be tested for zoning, we would be making significant progress in this area. That is something that can be done in each local area throughout the United States.

CHAIRMAN GIBBONS: Do other members of the panel wish to respond at this point?

MR. INGLE: I think that is a wonderful idea but, as I pointed out in my talk, a third of Florida's counties have no planning or zoning and practically no restrictions on land use.

In order to implement what Mr. Fraser recommends we have to beat the counties and cities over the head to the point where they will acquire the sophistication necessary to do what he speaks of.

Two or three sessions of the legislature have considered bills that would have mandatory state-required planning and zoning by local governments but they failed miserably each time. They are going to try again this year, with perhaps a little better chance of success.

However, I agree, it would be a wonderful idea if local governments could be persuaded to do that but the story of local government control is too often the story of local abdication of responsibility and refusal to do anything. Perhaps what is needed is an enlightened and enraged public citizenry in relation to effecting this.

DISCUSSION LEADER BOSSELMAN: Having seen some of the Sea Pines development, I think that Mr. Fraser is understating, if anything, the job that he has done in protecting the natural characteristics of the area as much as possible.

I would encourage anybody who is involved with development and encouraging other developers to do a similar job, to visit the Sea Pines Company development and see how it can be done.

CHAIRMAN GIBBONS: I believe there is a question from the floor.

MR. THREINEN [Wisconsin]: In the discussion with other developers, what are the economics? What is the market you are developing for?

MR. FRASER: Our developments pertain to the higher income community. However, it is not the wildlife preservation program which has forced the high income — it is the fact that we are on the ocean front, which is a scarce and limited resource.

The great cost problems are not in wildlife action. We set aside a part of the Sea Pines Plantation as a wildlife area when we first started after working with the Soil Conservation Service and wildlife biologists to identify the area. For the next fifteen years, in effect, that area will cost us nothing. The greatest costs to a developer are in his water and sewage systems, and road systems. These are the things that burn up a great amount of the cost. Therefore, the things that you are advocating are almost negligible in the overall cost of a large community.

Therefore, there is no legitimate argument, in my opinion, that you should not set aside appropriate areas. The problem is that if you advertise that you are doing this, then you are misleading people if all of a sudden you shift and tear the areas up. That is the outrage.

For example, if there were no restrictions on Sea Pines today, the land areas that we have set aside would have an appraised value of about \$15 million and yet the land only cost us about \$50,000 when we originally acquired it. It has value today because it is surrounded by four golf courses and hundred-thousand-dollar homes. Therefore, our cost of paying interest to the bank on that area has only been on the \$50,000, not the appraised value today.

Therefore, it is not something that a county government could purchase at \$12 million and set aside as public parking. You have to catch the developer in the very early stages of development, and force him to make a public commitment by your persuasion that this will help his overall values.

Of course, a legitimate argument could be made that Sea Pines would not have survived as a community had it not had this wildlife refuge which attracted so many people to the area who were sensitive to wildlife preservation. This was the distinction between success and failure.

The last ten lots that we sold on the beach were sold to bird watchers. Now, you can never quantify this — you cannot prove that it was essential or not essential but you can

say that it cost very little in terms of hard dollars.

In our project in Puerto Rico we put a half million dollars into the trail system, a rare exception. We are spending \$20 million in a water and sewage system and so, relatively speaking, the total wildlife preservation program is probably never going to be more than five percent of the sewage system cost.

MR. KLESSIG [Wisconsin]: Mr. Fraser, you may remember that in the Krueger Development Study of a year ago, the main difference found between your development and most other developments was that you plan to stay in the community several years after the homes are sold whereas, in Wisconsin, developers intend to leave five to ten years after they start developing.

Now, on that basis, what kind of additional incentives does that give you in the early planning stages of your development program?

MR. FRASER: It is hard to say.

For example, I grew up in an area where people used to plant live oaks when they were about eight years old and they would hardly be around to see what the live oak looked like a hundred years later. Therefore, I think that people should think in terms of what the place will be like anywhere from 50 to 100 years later, even though they do not plan to stay around that long.

Certainly, if they do intend to operate the water and sewage systems and the recreational components after the developmental cycle is completed, they would have a somewhat greater sense of responsibility to what the community is going to look like later. If they did a bad job they would be around to catch the brunt of the criticism.

CHAIRMAN GIBBONS: I think we will hold the questions at this point and proceed to Fred Bosselman. We will leave the program open for questions after his presentation.

# Constitutional Limits in Protecting Critical Areas

Fred P. Bosselman

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Almost two hundred years ago James Madison put pen to paper and came up with the following words which got tacked onto the Fifth Amendment to the U.S. Constitution, "nor shall private property be taken for public use without just compensation." This "taking clause" of the U.S. Constitution was subsequently repeated with various modification in the constitutions of the various states.

Since its adoption this clause has served as the chief bulwark of protection for property owners against arbitrary confiscation of their property by governmental agencies. The past few years have seen a renewed interest in the taking clause by property owners objecting to governmental actions designed to slow growth or protect the environment. The pervasiveness of such problems all over the country, but particularly in those areas where concern over growth and environmental protection is particularly strong, make it worthwhile to examine in some detail the way the courts have interpreted the dozen words that make up the taking clause.

It is not surprising to find the taking issue a pervasive problem. What is surprising, however, is the myths that surround the taking clause. Some people seriously believe that the Constitution gives every man the right to do whatever he wants with his land—foreign concepts like "environmental protection" and "zoning" were probably sneaked through by the Warren court. Many more people recognize the validity of land use regulation in general but believe that it may never be used to reduce the value of a man's land to the point where he can't make a profit from it. In fact the courts have never adopted either of these philosophies, yet they are influential with thousands of local government officials who play the major role in regulating the use of land.

The right to make money buying and selling land is a cherished American hobby and one that cannot be lightly ignored. But in an increasingly crowded and polluted environment one must ask the question whether we can afford to continue circulating the myth that tells us that the taking clause protects this right of unrestricted use regardless of its impact on society. On the other hand, we must not let concern for the environment blind us to the fact that regulations have real economic impact on real people, and we must search for solutions that will take their interest into account.

Current controversies under the taking clause usually arise when a governmental agency (usually local government) adopts a law limiting the type of development that can take place on particular land to such uses as agriculture or low-density housing.

The user of ordinary English may wonder what this has to do with the concept of "taking." The word "take" ordinarily refers to the act of obtaining

possession or control of property, and although there are many other usages of the word, none of them seems descriptive of governmental regulation of the use of land.

But history has given the word its own special legal gloss. The concept of taking originally referred to the seizure of land by the government and it retained this meaning through the time it was incorporated into our Constitution and for a century thereafter. Only after the turn of the 20th Century did the courts begin to expand the meaning of taking beyond the original conception. Indeed, until this period, the law recognized two separate rules regarding governmental powers over land: a duty to pay compensation if land were seized for public use, and a right to regulate the use of land as long as the regulation was reasonably related to a public purpose.

The taking clause derived from the English nobles' fear of the King's seizure of land for his own use, a fear that was reflected in Clause 39 of Magna Carta "no free man shall be deprived of his freehold unless by the lawful judgement of his peers and by the law of the land." In theory, the Fifth Amendment prohibition against taking without compensation can be traced to that Clause 39 of the Magna Carta.

But even before Magna Carta, regulation of the use of land was commonplace. Twelfth Century English ordinances have been found requiring neighbors to give 1½ feet of their land each to construct a stone party wall 3 feet thick and 16 feet high. Other provisions of the same date protected views and access to light. A case in 1302 reports one Thomas Batt being charged with neglecting to put tiles instead of thatch on his house to prevent the spread of fire.

In the 16th Century, Queen Elizabeth by proclamation forbade the construction of any new houses within three miles of the city. This proclamation was followed by an act of Parliament in 1588 which prohibited the construction of any cottage or building at a density greater than one building to four acres—the first large-lot zoning. An early proclamation in 17th Century Stuart England decreed that no new houses were to be built in London or within nine miles thereof unless the outer walls and windows and forefront were made of brick and stone.

At no time was compensation provided for such restrictions, nor is there any evidence that anyone ever thought there should be. Compensation was for *actual taking*. Thus, the famous jurist, Edward Coke, in the 17th Century declared that "lands, tenements, goods and chattels may not be *seized* unto the King's hands contrary to the great Charter and the law of the land." Blackstone a century later said that "legislatures alone can compel the individual to acquiesce in the *taking* of land by giving him a full indemnification and equivalent for the injury thereby sustained."

Colonists of North America brought the ideas of 17th and 18th Century England to a new continent. Here land was plentiful and landowners were free from the feudal lords who claimed a share of the profits of the man who worked the land. Nevertheless within a few years after colonization the colonial governments also began to regulate the use of the land. A 1631 act in Virginia required each white adult male over 16 to grow two acres of corn. A 1642 act required the growing of at least one pound of flax and hemp. And an act of 1656 required landowners to cultivate at least 10 mulberry trees per 100 acres



in order to stimulate the production of silk. Later in the 17th Century a Boston ordinance confined the location of slaughter and tallowchandler houses to certain sections of the city. The first aesthetically oriented land use regulation was passed in Philadelphia in 1700 requiring every owner or inhabitant of any land and every house in Philadelphia to plant one or more trees before the door of his or her house, not exceeding 8 feet from the front of the house “to the end that the said town may be well shaded from the violence of the sun and the heat of the summer and thereby be rendered more healthy.”

These same colonial governments passed many acts for the necessary taking of land and paid compensation for land taken for roads, courthouses, prisons, or for new towns. What sketchy history there is of the Bill of Rights indicates again that the founding fathers were concerned not with the regulation of property, but with its physical taking, although there is a dearth of information available with respect to debate on the last clause of what is now the Fifth Amendment.

Very few of the early state charters and constitutions had bothered to include a taking clause because there was apparently so much cheap land available that there was little need for the government to acquire privately owned land for governmental purposes. During the American Revolution however, both the English and the Colonial armies frequently confiscated land and other supplies for military purposes. An early commentator concluded that the taking clause was added to the Bill of Rights to restrain “the arbitrary and oppressive mode of obtaining supplies for the army, and other public uses, by impressment, as was too frequently practiced during the revolutionary war, without any compensation whatever.”

Theories of the origin of the taking clause are many, but what is clear is that the first hundred years of judicial interpretation of the taking clause gives no hint that anyone thought to consider it a ground for holding a private property regulation an exercise of the police power to be a taking.

Typical of the early 19th Century cases was *Coates v. Mayor of New York*, 7 Cow. 585, (N.Y. 1827). A statute of New York authorized the City of New York to make by-laws regulating and preventing the interment of the dead within the city. Plaintiffs had bought land from the city specifically to use as a cemetery. Some years later, after urban growth had surrounded the property, the city passed an ordinance forbidding the burying of the dead in that area. The Court specifically held that:

This by-law is not void either as being unconstitutional or as conflicting with what we acknowledge as a fundamental of civilized society, that private property shall not be taken either for public use without just compensation. No property has, in this instance, been entered upon or taken.

(7 Cow. at 605-606)

Justice Shaw of the Supreme Judicial Court of Massachusetts in the mid-19th Century case of *Commonwealth v. Alger*, 7 Cush. 53 (1853) summarized the general view at that time of the taking clause:

We think it is a settled principle, growing out of the nature of well-ordered civil society, that every holder of property, however absolute and

unqualified may be his title, holds it under the implied liability that his use of it shall not be injurious to the equal enjoyment of others having an equal right to the enjoyment of their property, nor injurious to the rights of the community . . .

This is very different from the right of *eminent domain*—the right of a government to take and appropriate private property to public use whenever the public exigency requires that, which can be done only on the condition of providing a reasonable compensation therefor . . . nor does the prohibition of such noxious uses of property—injurious to the public—although it may diminish the profit of the owner, make it an appropriation to a public use, so as to entitle the owner to compensation (7 Cush. 53 at 84-85).

A treatise writer of the time, Theodore Sedgwick, said:

It seems to be settled that, to entitle the owner to protection under this clause, the property must be actually taken in the physical sense of the word . . . (Sedgwick, *Constitutional Law* (1st Edition, 1857) at 519-520.)

In *Mugler v. Kansas*, 123 U.S. 623 (1887) the Supreme Court considered the effect of a state law prohibiting the brewing of beer. The brewery owner argued that this constituted a taking of his property. The state argued it was validly exercising its police powers. The court upheld the law, stating what was then the accepted rule with respect to regulation and taking:

A prohibition simply upon the use of property for purposes that are declared by valid legislation to be injurious to the health, morals or safety of the community cannot in any just sense be deemed a taking or appropriation of property for the public benefit. Such legislation does not disturb the owner in the control or use of his property for lawful purposes nor restrict his right to dispose of it, but it is only a declaration by the State that its use by anyone for certain forbidden purposes is prejudicial to the public interest.

Meanwhile back in Massachusetts, a young legal scholar was unhappy about this relationship of the police power and the Fifth Amendment. Writing in the *American Law Review* in 1872 he asked if the police power was the term “invented to cover certain acts of the legislature which are to be unconstitutional but which are believed to be necessary?”

After he was appointed to the Supreme Judicial Court of Massachusetts, Oliver Wendell Holmes, Jr. had occasion to express these views from the bench. In 1889, just two years after *Mugler v. Kansas*, Holmes wrote an opinion in *Rideout v. Knox*, 143 Mass. 368 (1889) in which he suggested that many regulations might violate the taking clause.

Thirty-three years later Holmes had his big chance. By now he was on the Supreme Court when it was presented with the case of *Pennsylvania Coal v. Mahon*, 260 U.S. 410. The case began in northeastern Pennsylvania, which at the beginning of this century was a well-populated area rich in anthracite coal. Unfortunately, the digging of mine shafts and the taking of coal from the ground leaves a void beneath the earth's surface. If enough coal is taken, the surface will no longer be adequately supported and will collapse, a phenom-

non referred to by the term “surface subsidence,” which literally removes the earth’s support from under the towns and cities of the anthracite region. As the resulting subsidence continued to increase, residents of the anthracite region saw their homes and businesses destroyed and their own safety threatened. The Pennsylvania legislature passed legislation in 1921 which prohibited the mining of coal so as to cause the subsidence of any buildings, structures, or transportation routes within the limits of a designated class of municipalities.

In September of 1921, H. J. Mahon and his wife were living in his home on land that had once been owned by the Pennsylvania Coal Company. When the company had conveyed title to the property in 1877 to Mahon’s predecessor in title, the company retained the mineral rights below the surface of the property, specifically stipulating a waiver of any future claim against the coal company for personal injury or property damage due to possible mine subsidence. In September of 1921 the coal company notified the Mahons by letter that mining operations would begin beneath their premises which would shortly thereafter cause the surface of the lot to subside.

Mahon, who happened to be an attorney, immediately filed a bill in equity to have the mining operation enjoined on the basis of the state law. Holmes held that the property was taken without just compensation contrary to the Fifth Amendment. He wrote the famous sentence that has been quoted and re-quoted hundreds of times:

The general rule at least is that while property may be regulated to a certain extent, if regulation goes too far it will be recognized as a taking.

In a famous dissent in that case Justice Louis Brandeis argued that Holmes “general rule” was completely inconsistent with prior law.

Every restriction upon the use of property imposed in the exercise of the police power deprives the owner of some right theretofore enjoyed, and is, in that sense, an abridgment by the State of rights in property without making compensation. But restriction imposed to protect the public health, safety or morals from dangers threatened is not a taking. The property so restricted remains in the possession of its owner. The state does not appropriate it or make any use of it. The State merely prevents the owner from making a use which interferes with paramount rights of the public.

The *Pennsylvania Coal* decision remains the landmark case. Since then the Supreme Court has dealt with the distinction between police power regulation and governmental taking only rarely. Later in the 1920’s the court took the case of *Miller v. Schoene*, 276 U.S. 272 (1928) in which the court reviewed a statute of the State of Virginia requiring the destruction of red cedar trees without compensation to the owners because it produced a cedar rust that damaged apple orchards. Citing the *Mugler* case, the court upheld the validity of the ordinance against the charge that it constituted a taking.

After the 1920’s the Supreme Court virtually retired from the field of land use. Its one case of significance, *Goldblatt v. Town of Hempstead*, 369 U.S. 590 (1962), was a brief opinion upholding the towns right to order discontinuance of an existing quarry. Because of this, *Pennsylvania Coal v. Mahon* has set the parameters for all subsequent taking cases.

As a result of the *Pennsylvania Coal* case, over the last fifty years state courts have decided literally hundreds of cases, each of which determines whether the value of a particular land use regulation does or does not outweigh the loss of property value to a particular landowner. As might be expected, given the lack of leadership from a common central court, these massive decisions have often been characterized as chaotic. Interpretations of the taking clause thus vary considerably.

But the dramatic upsurge of concern over the environment which took place in the late 60's and early 70's has created a "new mood," as the Rockefeller task force called it, which has affected the judiciary as well. Cases decided after January 1, 1970 show a definite trend to upholding land use legislation. Five cases are worth discussing in some detail:

*Just v. Marinette County*, 56 Wis. 2d 7, 201 N.W. 2d 761 (1972). In 1966 the State of Wisconsin enacted a Shoreland Protection Act requiring that local governments adopt shoreland zoning regulations to protect the condition of the state's many lakes and waterways. Marinette County passed a shoreland zoning ordinance based on a model state ordinance, placing shoreland areas in a conservancy district. The Justs' own property facing on Lake Norquebay, the front half of which was covered with aquatic plants, and the back of which contained a stand of trees. They began to fill the front half of the property contrary to the ordinance. The county obtained an injunction and the Justs appealed to the Supreme Court of Wisconsin. Recognizing what it took to be a serious conflict between the public interest in stopping the despoliation of natural resources and an owner's asserted right to use his property as he wishes, the Supreme Court of Wisconsin upheld the right of the county to restrict the use of the Justs' property to its use in its existing state as a swamp. Said the Court (at 769):

What makes the case different from most condemnation or police power zoning cases is the interrelationship of the wetlands, the swamps and the natural environment of shorelands to the purity of the water and to such natural resources as navigation, fishing and scenic beauty. Swamps and wetlands were once considered wasteland, undesirable and not picturesque. But as the people became more sophisticated and appreciation was acquired that swamps and wetlands serve a vital role in nature and are essential to the purity of the water in our lakes and streams. Swamps and wetlands are a necessary part of the ecological creation and now, even to the uninitiated, possess their own beauty in nature.

To the Justs' argument that there had been a taking the Court replied at 770:

Too much stress is laid on the right of an owner to change commercially valueless land when that change does damage to the rights of the public. The Justs argued that the property had been severely depreciated in value but this depreciation in value is not based on the use of the land in its natural state but on what the land would be worth if it could be filled and used for the location of a dwelling. While the loss of value is to be considered in determining whether a restriction is a constructive taking value based upon changing the character of the land at the

expense of harm to the public rights is not an essential factor or controlling.

*In the matter of Spring Valley Development*, 300 A.2d 736 (Me. 1973). The Maine Site Location Law requires persons intending to construct or operate a development which may substantially affect the environment to notify an Environmental Improvement Commission of their intention before commencing operation. If the Commission determines that a hearing is necessary, the developer then has the burden of satisfying the Commission that the development will not substantially adversely affect the environment or pose a threat to the public health, safety or general welfare.

Lake Sites Inc. owns a tract of approximately 92 acres located alongside Raymond Pond in the State of Maine. The Commission directed Lake Sites to stop developing the subject property until Lake Sites had applied for and received the Commission's approval of their Spring Valley Development. The property was to be divided into 90 lots to be sold to individual purchasers for the construction of year-round or part-time homes. Lake Sites appealed to the Supreme Judicial Court of Maine.

After holding that the Site Location Law did apply to residential subdivisions, units of which were to be sold at a profit, the Court proceeded to Lake Sites' contention that the application of the Act to its property amounted to an unconstitutional taking of its land without compensation. The Court dismissed the contention out of hand: (at 746-748)

It seems self-evident in these times of increased awareness of the relationship of the environment to human health and welfare that the State may act—if it acts properly—to conserve the quality of air, soil and water. To do so the State may justifiably limit the use which some owners may make of their property.

We consider indisputable the limitation of the use of property for the purpose of preserving from unreasonable destruction the quality of air, soil and water for the protection of the public health and welfare as in the police power.

Continuing at 751:

The legislature had declared the public interest in preserving the environment from anything more than minimal destruction to be superior to the owners' rights in the use of his land and has given the Commission adequate standards under which to carry out the legislative purpose.

*Golden v. Planning Board of Town of Ramapo*, 285 N.E. 2d 359 (N.Y. 1972). Concern with what it regarded to be unregulated growth under its existing ordinance, the Town of Ramapo extended the concept of zoning to include a permit system for residential development which measures the availability of municipally-provided services to evaluate the suitability of land for residential development. A developer could not build more than one residential unit on a pre-existing zoning lot without showing that each lot to be developed was within a minimal distance from sewers, fire protection, school and the like. Points were assigned according to proximity to the required services, and a

developer with 15 points was permitted to build.

The necessary facilities were scheduled for the entire town in a six-year capital budget and two supplemental six-year capital plans. Under this program it was possible that some land could be kept for residential development for as long as eighteen years.

The court explored the growth pressures and comprehensive planning recommendations which had resulted in the provision to eliminate premature subdivision and unchecked suburban sprawl. The court found the restrictions “substantial in nature and duration” but “not absolute.” The court concluded:

In some, where it is clear that the existing physical and financial resources of the community are inadequate to furnish the essential services and facilities which a substantial increase in population requires, there is a rational basis for phased growth and hence, the challenged ordinance is not violative of the federal and state Constitutions. (285 N.E. 2d at 303)

The court thereby recognized the right of the local government to restrict development in accordance with the ability of the municipality to provide essential services. The result has been a proliferation of “development timing” ordinances throughout the United States.

*Steel Hill Development Inc. v. Town of Sanbornton*, 469 F. 2d 956 (1st Circuit 1972). The Town of Sanbornton is a small community in the hills of New Hampshire with a year-round population of approximately 1,000. But the growth of both winter and summer recreational facilities in the area, together with the extension of Interstate Highway 93 and nearby lake and ski facilities, caused the building of some 400 seasonal homes and attracted a summer population of an additional 1,000 residents.

The Steel Hill Development Company proposed building an additional 500 units on approximately 510 acres. At public hearings attended by an aroused citizenry, the local planning board placed approximately 70 percent of Steel Hill’s land in six-acre minimum lot agricultural district zones and prohibited the “cluster” development altogether. Alleging that the rezoning bore no rational relationship to the health, safety, morals or general welfare of the people of the State of New Hampshire and the reduction of the value of the land was a taking without compensation, Steel Hill appealed the rezoning. While criticizing the town’s method of handling its problem as stop-gap, the court nevertheless recognized as within the purview of the general welfare:

Concerns relating to the construction and integration of hundreds of new homes which would have an irreversible effect on the area’s ecological balance, destroy scenic values, decrease open space, significantly change the rural character of this small town, pose substantial burdens on the town for police, fire, sewer, and road service, and open the way for the tides of weekend “visitors” who would own second homes. (469 F. 2d 961)

The court then affirmed the decision as a legitimate stop gap measure, adding that hopefully Sanbornton would soon begin to plan with more precision for the future. (469 F. 2d at 962).

*Selby Realty Co. v. City of San Buenaventura*, 514 P.2d 111 (1973). The plaintiff

owned a substantial tract of land in Ventura County, California. The county adopted a general plan containing a circulation element indicating the general location of proposed streets. Some of these streets crossed the plaintiff's land. The plaintiff applied for a building permit to construct apartments and his drawings showed an intention to build some of the apartments on area designated for a street in the county plan. The building permit was denied and the plaintiff brought suit, alleging that a taking of his property had occurred and that he should either receive his building permit or be compensated for the value of his property. The court rejected the plaintiff's argument:

If a governmental entity and its responsible officials were held subject to a claim for inverse condemnation merely because a parcel of land was designated for potential public use on one of these several authorized plans, the process of community planning would either grind to a halt, or deteriorate to publication of vacuous generalizations regarding the future use of land. We indulge in no hyperbole to suggest that if every landowner whose property might be affected at some vague and distant future time by any of these legislatively permissible plans was entitled to bring an action in declaratory relief to obtain a judicial declaration as to the validity and potential effect of the plan upon his land, the courts of this state would be inundated with futile litigation. It is clear, under all the circumstances, that plaintiff has not stated a cause of action against the county defendants for either declaratory relief or inverse condemnation.

(at 117-118)

Having heard these cases, you might think that I was making a biased selection of decisions orientated towards the government point of view. In fact, however, you will be hard put to find anywhere in the country a court that is using the taking clause to strike down land development regulations in any fashion that is consistently favorable to the landowner.

The moral of these cases is clear. Where land is not by its nature suitable for development without filling or other substantial alteration, and where its present use offers important values such as wildlife protection, the government may by regulation forbid a major change in the existing use of the land.

If the trend of these cases continues it will have major implications for wildlife protection. In addition to the management of public areas, equal attention will need to be paid to the regulation and enforcement of rules regarding privately owned wetlands and other wildlife areas.

## **Discussion**

CHAIRMAN GIBBONS: Fred, there have been a couple of recent court decisions on the question of a community's ability to control growth. Without trying to get into the technical legal aspects, how do you predict the courts will swing in either upholding or knocking down slow-growth actions?

DISCUSSION LEADER BOSSELMAN: There are two factors.

One, is whether the land that is involved has some critical environmental importance. In areas where you can show, through the type of studies that the McHarg firm did for the Sea Pines Company or similar studies, that the physical characteristics of the land are such that they are of great public importance, then I think regulations designed to prevent development will hold up in court.

That, of course, does not cover the great majority of the slow-growth or no-growth type of regulations.

We are seeing them, for example, in the cornfields of Illinois, where I am sure it would be very difficult to apply any good environmental accountability based on physical characteristics of the land. I think that, in those types of areas, the right to travel, the right of the people to move across the country, is a constitutional issue of major importance and that these slow-growth or stop-growth movements when applied to land use, in ordinary, average circumstances, are not going to hold up in court unless they can make an effort to provide alternative locations where development can take place.

This, in turn, is very difficult for local governments to do but, as you move more and more to development of control by state government, you may be able to get state governments to decide that we will have growth here and not have growth there and in this way overcome the constitutional objections.

I did not treat the right-to-travel question as a major constitutional issue here because, particularly from the wildlife management standpoint, I think you would never reach the right-to-travel issue because you could find strong environmental circumstances relating to that land.

MR. JOHN AHLBURGER [Colorado Fish and Wildlife Service]: I have a question for Mr. Fraser.

On your Sea Pines Plantation development, what percentage of homes that are purchased are secondary homes as opposed to primary homes? Also, in relation to the secondary homes, what is the length of use during each year by people utilizing that residence?

MR. FRASER: Sea Pines Plantation has approximately 1,000 homes and approximately 1,000 townhouse-condominiums. Of the 1,000 homes, about 400 are occupied as year-round residences by retired individuals; about 200 are occupied by year-round residents working in the area and about 400 by people who use them seasonally.

Many of the homeowners rent them out to others when they are not using them for their own family vacations.

About 80 percent of the townhouses are used for vacation purposes. Of the 80 percent used for vacation, 75 percent of that 80 percent rent them to others when not using them. Therefore, in the spring and summer, almost all 2,000 homes and townhouses are full all the time.

I might add that very few people today maintain second homes which they alone use, but a typical second home, a typical condominium for tax reasons, is in effect a multiple-use facility, even though owned by one family.

FROM THE FLOOR: Again, in relation to the development of operation area, for what period of time are these homes designed to last?

MR. FRASER: One of the great problems that we face in this country for the first time in a hundred-fifty years is large-scale development which is really a fraud.

For example, that happened in the 1840's. The London newspapers were full of advertisements of town lots being sold, for example, in nonexistent areas.

The same thing has happened extensively in the United States but in those areas where houses are once built, generally they are just as permanent as the subdivision.

It would be appropriate for states to say that large-scale communities could not be built except with some reasonable relationship between the number of lots being sold and the number of houses built each year. For example, after the first 200 or 300 lots are sold, for every 100 lots permitted to be sold again, at least 10 houses would have to be built. That way you insure that it isn't a fraud.

FROM THE FLOOR: However, my question is how long does one of these developments last?

MR. FRASER: Well, as long as a house will last anywhere. Our houses will last, hopefully, hundreds of years, especially if they are not knocked down by a hurricane.

FROM THE FLOOR: How about the public buildings.

One of the things we face in a number of public areas is, for example, we have designed schools in various areas and their life expectancy quite often is from 30 to 50 years. We are right now in a period, for example, where they have to be replaced again at public expense.

MR. FRASER: Well, let me say that a school that lasts for 50 years has done a good job



for the population around it. Further, the population no doubt has dramatically changed since it has been built.

I would not worry about most buildings of this kind not lasting over 50 years.

MR. KEN KLEPINGER [Department of Natural Resources, Wisconsin]: I note that in two of the titles, Mr. Ingle and Mr. Bosselman have used the term "critical area." I wonder if anybody has a precise definition of this and, if so, do you think it would be wise to have this definition included in a statutory definition for purposes of establishing regulatory authority.

CHAIRMAN GIBBONS: There is a definition in the National Land Use Policy legislation that would urge states to enact such legislation to protect areas of critical environmental concern. However, it is a very general definition. It could leave a lot open to interpretation, including scenic and historic areas, also agriculturally productive land, and flood plains.

However, it is the statute drafters in places like Florida that have to identify the specific areas broad enough to be covered under their state laws.

MR. FRASER: I would like to protest the practice of some draftsmen, who attempt to deliberately confuse the public when they define critical environmental areas, beginning, for example, with a series of essential biological or geological characteristics, like wetlands, areas of important wildlife areas, steep slopes, and flood plains, and then about 300 words down the line in relation to the same definition, they then start talking about areas of rapid growth. They will also sneak in critical ecological and environmental areas, for example, at the tail-end of some biological descriptions. Here, again, you begin to find phrases such as "any areas near schools, roads, hospitals, areas of housing and shopping centers." However, the layman does not think of that as an environmental or ecological issue—he thinks of it in terms of a congestion-of-growth issue.

Therefore, these ought to be two different things and treated separately—the areas that you protect because of their special physical characteristics, as a piece of biology, and areas where you are trying to have good planning because it is a high growth area.

These, in my opinion, are improperly co-mingled in much advocacy in the state legislatures today.

CHAIRMAN GIBBONS: Florida, I think, has a general definition.

MR. INGLE: The Florida definition does not attempt to draw a line between two categories.

In the Act it is not called a "critical environmental area," it is deliberately called "an area of critical state concern." Then it goes on to list three types of areas of critical state concern:

First, an area containing or having a significant impact upon environment, historical and natural or archeological resources of regional or statewide importance.

An area significantly affected by or having a significant effect upon an existing or proposed major public facility or other area of major public investment.

A proposed area of major development potential which may include a proposed plan of a new community designated in a state development plan.

Let me give you an example, starting backwards.

A large conglomerate corporation, which shall remain nameless but has the initials ITT, is developing an area which, as projected population wise, will increase the present size of that county something like five times within the next ten years.

This county is just about defenseless in this. It has no zoning, no planning, no building regulations, no subdivision regulations, no plat recording departments, nothing, and the county commission is not particularly anxious to start on it. Of course, they think that this growth factor is great because it will be providing jobs for citizens and so they are not inclined to want to control it.

If the state can be said to have a legitimate interest in what happens to a new community that is going up overnight with 100,000 people in it, then that would be an area for state concern and not necessarily just because of its environmental consequences.

The other example, certainly to be significantly affected by a major public investment, could be, let us say, condominiums springing up all around the boundaries of a national park or wildlife refuge. It could be an airport or something like a major hospital.

Now, with regard to the first category, this has to do with whether or not an area is significantly affected by navigable resources or archeological resources or historical

resources of greater than local significance. An example of the natural resource type is the big Cypress Swamp in South Florida. This is partly crucial because there is a set flow of water that goes over a very gradual slope. It drops something like ten feet in twenty miles. The water from the lake and rainfall moves slowly at or just slightly below the surface of the land down South toward the Gulf of Mexico and Florida Bay. That is important because it nourishes the Everglades National Park and thus it has significant impact upon major public investment.

FROM THE FLOOR: I wonder if you would comment on your opinion on transferrable development rights.

DISCUSSION LEADER BOSSELMAN: You know, this question comes up every time I make a speech at one of these conferences. Of course, it likewise is not an easy one to answer.

When I first got into this field, I wrote an article about what a great idea this was. This is the sort of thing that really intrigues lawyers. It has a sort of legal mystique about it, something you want to sink your teeth into.

However, as I have gotten older, I have become increasingly disenchanted with the practical problems of trying to implement anything on a large scale involving transferrable development rights. I don't think the problems are legal and constitutional.

If it is done on a limited basis, as has been suggested and is to some extent being used in New York for preservation of parks, and in Puerto Rico to protect certain critical wetlands, then I can see some possibilities for it.

However, people who think they are going to transform the entire system of land-use regulation into a system of transferrable development rights, I think, are operating in a very abstract and unreal world.

I am glad to see experiments with it and it may be that when we see a little of it in practice, that I will become more optimistic again.

However, there are no places that you can go in this country or anywhere else in the world and see a working model of this on a large scale or even a good working model on a small scale.

MR. FRASER: It would be a good thing, however, if we could somehow convert our population into accepting the idea of transferrable development rights. It is a very equitable and very appropriate mechanism. The problem is simply getting acceptance of a very complex issue through local people who elect county commissioners who don't even want zoning.

Of course, zoning has, at times, been misused by local governments but the idea is sound and there are a few pragmatic guys, like one in Atlanta, who are about ready to convince local governments of this idea.

MR. THREINEN [Wisconsin]: We have here a developer who is shooting at, roughly, two percent of the public. Now, from the standpoint of public policy, would the public be better off collectively if government was in the role of the developer? I would like to pose that philosophical question to the whole panel.

MR. FRASER: Philosophically, I would like Congress to impose upon itself a certain amount of discipline.

For example, every time it appropriates funds for a large new building in Washington or a subway system, perhaps twenty percent of those funds should be disbursed around the states for parklands. If we just had twenty percent of the dollars that Congress has appropriated, for example, for the Washington Subway System, \$3 billion, for example, we would have adequate funds. Every state ought to be in this business. Florida, fortunately, has appropriated funds without condemnation rights but if you hassle the landowner enough, he can probably be persuaded that it is desirable to sell.

We positively are running short, badly short in this country of adequate green spaces in our city areas and near our urban areas for major recreational zones. It has been a bad scene for the last five or six years in terms of appropriations in this area.

What we do is important for a limited audience. For example, what we are doing in the mountains will serve perhaps forty percent of the population. However, that is still not enough. Therefore, what we do is no substitute for adequate funding in the park acquisition area.

MR. WILSON [Georgia Department of Natural Resources]: I would like to direct a question to Mr. Bosselman.

Have any other cases recently been cited in relation to the Marionette Case? That case seems to have great long-range ramifications. I wonder what the significance is.

DISCUSSION LEADER BOSSELMAN: It is a very recent case. I believe it is about a year and a half old. It has been cited in a couple of cases that have come up since then, one in California and one in Maryland that I am aware of. There was a recent decision of the Maryland court within the last few months upholding strict regulation of wetlands in that state. I am not aware of any cases in which it has been cited unfavorably, but, as I say, it is only a year and a half old and these cases are not coming up before the appellate courts in sufficient volume that you can really tell yet what the general reaction to them would be.

CHAIRMAN GIBBONS: Are there other questions?

Well, if not, thanks to all of you for coming and I want to thank the panel members for their time and effort.

In the final analysis, I hope that we are beginning to shift from instinct to reasoning and, further, I hope that Conferences like this will continue to play no small part in that shift.



## **TECHNICAL SESSION**

Monday Afternoon—April 1

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### **Nongame Wildlife: Policies, Responsibilities and Management Approaches**

*Chairman:*

C. EUGENE KNOTER

Director, Western Division,

National Audubon Society, Lakewood, Colorado

*Discussion Leader:*

ALAN G. LOUGHREY

Director, Planning and Coordination,

Canadian Wildlife Service, Ottawa, Canada

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### **Nongame Wildlife: Policies, Programs, Progress—A Panel**

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## **The States' Needs and Responsibilities in Nongame Wildlife**

Carl N. Crouse

*Director,*

*Washington Game Department*

*Olympia, Washington 98504*

I have been asked to express the state viewpoint on nongame wildlife. To do this we should take a quick look at the history of all wildlife in proper perspective.

The wildlife species traditionally fall into two major categories, hunted and nonhunted.

The early history of this country made no differentiation between the two groups and no consideration was given to the protection of any wildlife. It was there for anyone who desired to use it for whatever personal use his need dictated.

Wildlife uses by people have generally followed the following pattern:

1. No restrictions until such time as it reaches a point of over-commercialization or utilization which diminishes the supply.

2. Restrictions to limit the amount to be taken commercially.
3. Complete restriction of commercial use, allowing only personal use through restrictive recreational hunting.
4. Total protection of the wildlife species.

Nongame wildlife has, for the most part, gone from no protection, or category one, to total protection in one step, primarily because they had either little or no value as hunted wildlife or limited commercial value.

Through a process of recognition of the importance of nongame wildlife, laws prohibiting the killing of many species of nongame wildlife have been passed in all states and nationally. However, with increased human populations and industrialization resulting in massive losses of habitat and certainly with our present environmental concern, large segments of the public presently feel that more consideration should be given to the management of this resource as an important part of our entire ecological system. The desires of members of the general public for this type of management have long been recognized by all state wildlife agencies. Many of them have had programs in this area for a number of years which are just now being recognized by the public as being positive programs. Every state wildlife agency has a program for nongame wildlife, although there is considerable variance in the magnitude of the program.

As an example of the level of management and protection afforded different species of wildlife, in the State of Washington we have 10 species with no restrictions, 10 species with controlled commercialization, 67 species which may be taken by recreational hunting, and 305 species receiving total protection. And may I hasten to add before the question is asked, this does not categorize the various species of vertebrates commonly known as rats and mice, which I am sure soon will be.

If the state wildlife agencies are to be criticized for their activities or lack of them in this field, I am confident the criticism should be based on a lack of communications with the public on the magnitude of their efforts and I feel they have been justified, to date, in not attempting a strong public relations program in this direction.

The funds that have been used in the past and are still the primary source of monies for nongame wildlife protection and preservation are, almost without exception, funds furnished by hunters. This is obviously not going to be an acceptable approach for either people who have an interest in nongame wildlife or the sportsman who has traditionally financially supported his interest in the recreational hunting of wildlife.

For the states to meet the type of programs now being demanded, it is obvious that special funds must be made available for this purpose. There is no way this need can be met by either federal preemption in the nongame wildlife field or by states financing these programs with sportsmen's dollars. The capabilities of the states to have meaningful wildlife programs in the nongame area are well demonstrated by looking at the success of the states in hunted wildlife.

At the turn of the century it was commonly stated that the question was not whether hunted wildlife would survive, but how soon it would be extinct. The record of success of the states in managing hunted wildlife speaks for itself. As

examples, antelope have been increased tenfold; elk and turkeys five hundred percent, all within the last 50 years. A number of other good or better examples can be developed from the professional records. Our record on nongame wildlife can be made equally impressive but in an opposite direction. Our principal thrust has been to attempt to save a few species from extinction, such as the whooping crane or black-footed ferret. Scientific wildlife studies on habitat needs, life history, limiting factors or enhancement of these species is nonexistent if compared to the volumes of scientific and technical data on hunted wildlife.

If this expertise, which has been developed to save hunted wildlife from extinction and dramatically increase the numbers, can be applied in an equally vigorous manner to nonhunted wildlife, there is no question that these species can be perpetuated in numbers to meet the public demands in the future.

I feel the people of this country have the right to demand the same type of high professional management for the nongame wildlife populations they have seen demonstrated for the other species.

In looking back and trying to establish reasons for the states' remarkable success in solving wildlife problems I always reach the conclusion that the Pittman-Robertson Act was the single greatest catalyst in furnishing the primary thrust for our present-day success, as almost without exception the professional competence of the state was built and then greatly expanded from this money base. It is a perfect example of complete federal-state cooperation for the improvement of one of our great natural resources for the benefit of all people and is basically a program that has been administered through the Department of Interior as a state program.

A program such as this for nongame wildlife would bring home to the various state legislatures the need and desirability of funding the various state agencies in order that they may proceed with the proper type of management. It would not only result in the Federal Government joining with the states in such a program, but would also result in the states being responsive to the desires of its citizens in this area and being capable of carrying out needed programs.

There must be no question as to the basic responsibility of the states to manage this resource and there should be no federal-state jurisdiction questions. The management capabilities for nongame wildlife are found in the states, as has been indicated by meaningful programs that already exist in a number of them. The major problem remaining is the development of a stable acceptable funding source for all states.

We presently are in the same position with nongame wildlife, as far as funding is concerned, as we were 35 years ago with hunted wildlife. States are searching for funding programs and a number have been tried, such as voluntary conservation stamp purchases, personalized license plates, and general fund appropriations. The Federal Government, through Nathaniel Reed of the Department of Interior and Dr. Lee Talbot of the Council of Environmental Quality, has indicated strong support for a state-federal program for nongame wildlife.

I feel that the future of nongame wildlife is up to the states, and I am confident they have the desire and capabilities to meet this challenge.

As the states develop and expand their nongame programs, they will receive strong additional public support from people who enjoy wildlife, other than hunted species, and they will be assuming this role as complete state wildlife agencies, which they properly are.



# Nongame Wildlife: A Federal Perspective

Lee M. Talbot

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Developing effective nongame wildlife management is one of the major challenges facing the wildlife profession and the concerned authorities at federal and state levels. This paper describes the federal role in wildlife management in general, and in nongame wildlife in particular; presents the major problems presented by the current, game-oriented wildlife management; and discusses a federal role in developing a more balanced approach to total wildlife management.

## **The Federal Role**

The federal role regarding wildlife in general—much less nongame wildlife—is remarkably poorly understood. The federal role in any resource management is basically determined by the Constitution. Under that, the specific role derives from the specific responsibilities of federal agencies and from policies set by Congress.

### *Agency responsibilities*

In terms of responsibilities for wildlife, many agencies are in on the act. The Bureau of Sport Fisheries and Wildlife is the lead agency in the Federal Government for freshwater fisheries and wildlife management—that is its main business. However, the National Oceanic and Atmospheric Administration has responsibility for marine fisheries and certain forms of marine wildlife.

A number of agencies have wildlife responsibilities because of the land they manage. Roughly one-third of the nation's land, over 750 million acres, is public land under federal management. The Bureau of Land Management is responsible for 450 million acres, the Forest Service for 187 million, the National Park Service and the Bureau of Sport Fisheries and Wildlife manage roughly 30 million acres each, and the Department of Defense has about 25 million acres. Other agencies, such as the Atomic Energy Commission have smaller but significant areas. While other agencies have cooperative arrangements with the Bureau to utilize its expertise, each of them has responsibility for management of the wildlife habitat, and to varying degrees, for management of the wildlife, on the lands for which they have responsibility. Each has administrative organization for wildlife management and wildlife research facilities and programs.

Additional federal agencies are also involved in other ways. The Environmental Protection Agency has responsibilities for ecological and toxicological

research on wildlife, in connection with its regulation of pesticides and environmental protection in general.

Through the National Environmental Policy Act, all agencies must take wildlife into account in any major action they take which affects the environment, and must report on the impact of their proposed action in the required environmental impact statements. In this sense, then, every federal agency has a wildlife responsibility.

All agencies have a new responsibility for wildlife, one which some of them may not recognize yet. The Endangered Species Act of 1973, signed into law last December 28, established the policy that all federal departments and agencies have the responsibility of using their authorities to protect endangered species, and to keep other species of wildlife and plants from becoming endangered.

Finally, the Council on Environmental Quality is involved in four principal ways. We must maintain an overview of the nation's environmental quality—of which wildlife is an important component—and keep the President, Congress, and the public informed. We have responsibility for coordination of all federal environmental activities; consequently, where two or more agencies are involved on a wildlife issue, we have a coordination role. We have general responsibility for the environmental impact statement process; and we have primary responsibility for development of environmental policies and legislation for the Administration, which involves wildlife.

While wildlife is a federal responsibility in greater or lesser degree on one-third of the nation's land, it is primarily a state responsibility on the other two-thirds, but even here there are federal responsibilities. The states have responsibility for resident species, but the Federal Government has primary responsibility for migratory species. In addition, wherever there are international conventions or treaties involving specific forms of wildlife, these become federal responsibility. For example, certain bird and animal species covered by our treaties with Mexico, Canada, and Japan are federal responsibilities, even though individuals may be resident in a single state.

Under the Marine Mammal Protection Act of 1972, primary responsibility for marine mammals rests with the Federal Government. And the Endangered Species Act of 1973 provides federal responsibility for species which are endangered, and also for those likely to become endangered.

This is not an exhaustive listing but it does serve to illustrate the point that the Federal Government and virtually all its agencies have direct or indirect responsibilities for much of the nation's wildlife, wherever it is, whatever it is.

#### *Establishment of wildlife policy*

It is important to understand the process involved when Congress establishes policy for wildlife. In many areas, Congress has declared in legislation that some form of wildlife was significant to the nation and its people; and Congress established a policy for conservation of that wildlife. Congress cannot mandate state laws, so it generally mandates and authorizes action by the appropriate federal agencies. One Congressional objective often is to encourage the states to take appropriate action, and to provide assistance to them to accomplish this. The federal role usually involves establishing a policy or a set of standards or

guidelines. State action is pre-empted by the federal rules except when the states match or exceed the federal standards. There is often some provision for periodic review by the federal agency of the state compliance. Federal assistance usually takes the form of funding on some kind of matching basis, usually dependent upon state compliance with standards, and provision of expertise, research, or other direct assistance by the agency.

The point is that this is not intended as a federal takeover, as is often feared by state personnel. Congress directs the federal agencies to implement a particular wildlife policy. The federal agencies have to see that appropriate standards are met and pass the responsibility for carrying them out, along with funding and other assistance, to the states for action. Actual federal power is only applied where the states are not in a position to provide equivalent protection.

The procedure is this: Congress declares a policy, directs the Federal Government to implement it, and authorizes funds. The federal agency sets necessary standards and develops the program. If the states exceed the standards, they are given power to act, along with money and additional help to carry out the program. This means that the federal agency acts only in cases where the states do not wish to implement the program.

### **Nongame Wildlife**

Now, let us consider how this process applies to nongame wildlife. First, by nongame wildlife, I am referring to all wild fauna, any wild member of the animal kingdom from large mammals through invertebrates. I would prefer not to make a distinction between game and nongame wildlife, because wildlife as a whole represents a resource which has many values to man and for which there are many management approaches. Sport hunting represents one of those values, and one of the management techniques. In the long run it would be better for the resource and for its management if a distinction implying a polarity were not made. However, in the short run, and for this discussion, it is a useful distinction.

#### *Focus on game*

Wildlife management, both as a profession and as a national policy, developed for and as a result of hunters. Although there have always been those who valued wildlife for nonconsumptive purposes, until recently hunters have been the only effective national wildlife constituency. They have provided the funding for wildlife management, both at national and state levels, and as a logical consequence the wildlife management field became a game management field. In 1969, \$142 million was spent by all sources—federal, state, and private—for wildlife management, research, and habitat acquisition. Of this amount, only \$6 million, about 4 percent, was spent for clearly nongame purposes.

Since that time, nongame species have received a somewhat higher percentage of expenditures, largely because of the Endangered Species Conservation Act of 1969; and they should receive a greater percentage yet as a result of the new endangered species act. A number of states have been putting more effort into endangered species and some states into other nongame forms. Further,

some of the game-related funding clearly helps nongame forms. Any habitat improvement or maintenance benefits all the species, game or otherwise, which utilize that habitat. However, the fact remains that the great majority of wildlife effort is focused on the few game species, and the hunters, who make up slightly over 5 percent of the population, are largely footing the bill for managing the wildlife which is of value to the nation as a whole.

*Problems created by over-emphasis on game*

From a federal point of view, this situation poses at least four major problem areas:

1. One is the obvious inequity of the funding. In the days when wildlife had effectively one constituency—hunters—and one generally recognized resource value—sport hunting—the fact that the hunters paid for its management seemed reasonable. Now hunters are a small and decreasing proportion of the wildlife constituency; and we recognize a much broader spectrum of resource values from wildlife. The funding should reflect this.

2. Second is the inequity of effort from the standpoint of the wildlife resource. Traditional game animals include most of the larger North American mammals, deer, elk, moose, antelope, caribou, mountain goat, bighorn sheep, wild pigs, and bears. Small game, such as squirrels, rabbits, and furbearers, add somewhat to the list. Game birds include the waterfowl, doves, pheasants, pigeons, turkey, quail, grouse, and partridges. However, in the United States and its adjacent waters there are about 400 species and subspecies of native mammals and just under 800 species of birds. The hunted forms make up only a small percentage of the total number of species of native American wild birds and mammals. And then there are the reptiles, amphibians, and invertebrates. With our growing recognition of the importance and significance to man of all wildlife, it is simply not defensible to concentrate our attention on a very few species and forms.

3. The third major problem is the disparity between the value we now recognize for wildlife and the values we still manage wildlife for. Game management focuses on production of a shootable surplus. The resource value which is the focal point of management is the consumable commodity. Clearly, there are many associated values. If there weren't, most hunters would go to the butcher shop instead of the field. But hunting is the focus of game management. Now, however, we recognize a very broad spectrum of values from wildlife. Several of the most recent wildlife laws cite aesthetic, educational, historical, recreational, scientific, economic, and ecological values of wildlife to the nation and its people.

There is growing emphasis on the ecological role of wildlife. All forms of wildlife play some role in the ecosystem, so that their survival in adequate numbers may be important to the health and stability of the environment, and consequently to human welfare. The status of the nation's wildlife is nationally recognized now as of significance for the role it plays in maintaining environmental quality and also for what it indicates about that quality.

This principle is reflected both in direct legislation and in the courts. The Marine Mammal Protection Act states the policy that the objective of management is to assure that the species involved survive in adequate numbers to play

their role in the ecosystem, and that only when consistent with that primary objective can they be managed for consumption. This basic principle has been articulated internationally in the United Nations. Our courts have also recognized it.

In a landmark decision, in 1970, the New York State Court of Appeals upheld the constitutionality of that state's law (an Act to protect depleted and endangered species of wildlife) on the grounds that it was necessary for the state to protect the animals not only for their aesthetic value and for scientific study but for their key ecological role. The court ruled, therefore, that protection of these animals is essential for the welfare of society.<sup>1</sup>

However, beyond the ecological and other values now recognized, the aesthetic, recreational, economic, and other values derived from direct observation of wildlife have increased phenomenally in the past several years. Statistics on numbers of hunters are relatively easy to obtain. Statistics on nonconsumptive use of wildlife are much more difficult to assess. However, the available figures for public lands well show the trend toward dramatically increasing public use of wildlife for nonhunting, noneating purposes—mostly viewing and photographing. Visitor use data from BLM and Forest Service lands show hunter use remaining more or less stable during recent years, while total visits have increased significantly. The identified nonconsumptive wildlife visits have increased greatly, up to 25 percent per year in some cases.

We have a representative form of government, and the constantly growing constituency for nongame wildlife now vastly exceeds the small and proportionally shrinking game constituency. Some Senators and Representatives have told me that they have received more correspondence on certain nongame wildlife issues than they have on anything else, outside of Vietnam. Clearly, the nongame values to man of wildlife are perceived by the American public and increasingly are being translated into national public policy.

4. And this leads to the final problem we perceive from the present focus on game management, the increasing polarization between hunters and nonhunters. Although it has been the subject of increasing concern by the wildlife profession, I believe that far too many wildlifers still do not appreciate the magnitude of the shift in the orientation of their constituency and responsibilities from hunting to nonhunting. Their failure to recognize or respond to this situation constructively and the outspoken defensiveness of some of them have created a real credibility gap between them and the public and is turning increasing numbers of nonhunters into anti-hunters. In Congress and out, wildlife management is increasingly being equated with hunters and killing, and one of the results is that the wildlife professional is increasingly excluded from policy deliberations affecting wildlife. This situation benefits neither the public nor the wildlife resource.

## Conclusions

All of these problems can be dealt with if we can develop a balanced national program of wildlife management, which gives adequate consideration to all species, and which recognizes hunting and nonhunting as different but related

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<sup>1</sup>*Nettleton Co. v. Diamond*. 1 ERC 1700 (N.Y.Ct. App. 1970)

values and management techniques of the same basic resource. The International Association of Game, Fish and Conservation Commissioners and The Wildlife Society have recognized this in their report and model state legislation on nongame wildlife. The report of the Committee on North American Wildlife Policy last year discussed it in detail. Many states are actively trying to develop more balanced programs.

What we believe is needed now is a strong federal-state program funded from nonhunting sources and focused on nongame species which can complement the existing game-related federal state programs. The nonhunting-related federal funding source is critical, for the reasons I have discussed above, and also to provide a program to which the states can respond, *i.e.*, as a catalyst for the essential state role.

I believe we are at a critical point in the history of wildlife management. Wildlife and wildlife habitat have never had such severe challenges as those which our increasing population and technology are now providing; there has never been such strong public and legislative support for wildlife; nor such strong skepticism about the ability of the wildlife profession to manage it. I believe, however, that if we can develop an effective, balanced program, the wildlife profession will emerge greatly strengthened, and the resource will be well managed.

# Nongame Wildlife Programs Of Private Organizations

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The format of this paper is simple. I asked ten national conservation organizations and scientific societies concerned with wildlife to outline their historical and current activities in behalf of the nonhunted species. I have undertaken to summarize the summaries and have inserted a similar précis for the National Audubon Society. It should be recognized that the information presented here is illustrative only. It does not include the work of all national organizations involved with the conservation of nature, nor of innumerable regional, statewide and local organizations—some of an ad hoc nature formed to provide protection or preserve a habitat for a threatened species or population—whose combined influence on public and official attitudes has been tremendous.

I have not attempted either quantitative or qualitative analysis of the records and programs of the eleven organizations, but with respect to quantity it is interesting to observe that their combined annual expenditures just about equal the annual budget of the California Fish and Game Department—some \$22 million. But the private organizations have something going for them besides money. They have the enthusiastic help of thousands and even hundreds of thousands of members who volunteer their time and labor and, especially in the case of the scientific and professional societies, their technical expertise. Who but a group of Audubon, Wildlife Federation, or Izaak Walton League members can fill a courtroom and by their very presence keep a judge from letting an eagle-killer off with a light sentence? Who but such a group of citizens can lean on City Hall and prevent destruction of the town's last marsh or natural woods?

I will offer the personal judgment that the quality of their publications and also their efficiency in the use of funds and personnel have been as good as that of government agencies, and overall probably better.

Despite their relative lack of fiscal affluence—having had to depend on membership dues and contributions and occasional grants from foundations—the nongovernment organizations have accomplished far more in the scientific study and conservation of nongame species than the government wildlife agencies. This is because of the concentration by the government agencies on the game species, having found a substantial and dependable source of funds in the licensing of hunters and fishermen.

We believe we are on the verge of a shift in the proportionate roles, not that the nongovernment organizations will do less, but because the government agencies are now ready and willing to do more. And along with the readiness and willingness there is for the first time in history, I believe, a determination

on the part of many state wildlife agencies to go after funds from sources other than the traditional license fees.

*The new responsibility of the private organizations is to help them get the funds.*

I shall not read the letters I received from the ten organizations I queried, but I have been assured by the Wildlife Management Institute that they will be published in the proceedings. My respondents attached documentation and exhibits much too voluminous for the proceedings. With the permission of the Institute, the entire package of letters and exhibits will be presented to the conservation wing of the Denver Public Library where it will provide some good leads for future students wishing to research the history of public concern and official action in behalf of the non-game species.

It can be said in general that the professional and scientific societies have made their contributions to the cause chiefly in the promotion and publication of research, although some have had active conservation committees. Organizations with big lay memberships like the National Wildlife Federation, National Audubon Society and Izaak Walton League of America have supplied the political clout and conducted educational programs beamed at the general public. Some scientific societies have spawned lay groups, a notable example being the American Ornithologists' Union which in the 1890's and early years of this century had a special committee that worked hard and successfully at organizing Audubon Societies. The scientific societies provided the base of knowledge upon which the lay organizations built their educational and action programs.

My summary of the summaries:

*The American Ornithologists' Union* exists largely to encourage research through offering free publication to investigators, but it has a conservation committee whose reports also are published in *The Auk*. And as asserted by George E. Watson, Secretary, because AOU is the major professional ornithological society in the country, its recommendations are frequently sought or followed. Dr. Joseph J. Hickey, President, recalls that AOU had an early action program in conservation that led to establishment of the forerunner of the Bureau of Biological Survey in 1885 and the National Association of Audubon Societies (now National Audubon Society) in 1905.

*The American Society of Ichthyologists and Herpetologists* has been active in identifying and seeking protection for endangered species. From personal observation I can vouch that few groups have been more aggressive and persuasive than its committee headed by a Vice President for Conservation. As an indication that the "Icks and Herps" are with it, the name of the committee was changed last year from "conservation" to "environmental quality." Everyone at this Conference will agree that the quality of the environment will become abysmal if we cannot keep species like the alligator and American crocodile, the bog turtle, the horned lizards, and the pupfish. Our task is to explain why to the public and the politicians.

*The American Society of Mammalogists* considers publication of the *Journal of Mammalogy* to be its principal function, according to Bryan P. Glass, Secretary-Treasurer. It has, however, concerned itself for many years with the preservation of endangered species, chiefly through its standing Committee on



Conservation of Land Mammals and its standing Committee on Marine Mammals. Recent resolutions have addressed the problems of the pinnipeds of San Miguel Island, suggesting a preserve; the harassment of marine mammals by photographers; the killer whale population of Puget Sound; preservation of habitats in the Hawaiian Islands National Wildlife Refuge, in Baha California, and in the Mexican State of Coahuila; and control of wild horses and burros on federal lands. "Having served the Society as its secretary for the past 16 years," Mr. Glass writes, "I can assure you that when the Society speaks, agencies listen." I believe it.

The *Cooper Ornithological Society*, publisher of *The Condor*, took a vigorous stand against the use of thallium when this powerful, chain-reacting poison was first advocated and used officially as a rodenticide four decades ago. Leaders in the protest movement were Joseph Grinnell, E. Raymond Hall and Jean M. Linsdale. The latter served as chairman of an investigative committee and authored two reports, published in *The Condor* in 1931 and 1932, that nailed down the scientific case against thallium. It assuredly was a matter of great satisfaction to the Cooper Society when thallium was eventually outlawed as a rodenticide or predacide, and a matter of bitter irony when the chemical was used illegally in the wholesale slaughter of bald and golden eagles in Wyoming in 1971.

*Defenders of Wildlife* was founded in 1925 as the Anti Steel-Trap League, became Defenders of Furbearers in 1947, and evolved to its present name and broader concerns in 1959. It successfully sponsored the design and widespread acceptance of the Conibear "instant killer" trap, and its long thrust has been the prevention of unnecessary cruelty to wildlife. In recent years it has campaigned ceaselessly against the senseless persecution of predators. It has a responsive membership that can flood a Secretary of the Interior with supporting or protesting messages, depending on the issue. Using funds from an extraordinary bequest, Defenders recently expanded its staff and entered the field of habitat preservation, its most ambitious project to date being the acquisition of the extensive Aravaipa Preserve in Arizona. This area preserves habitats for mountain lions, golden eagles, prairie falcons, and two threatened species of fish. Another major project has been the leasing of 10,000 acres of Indian lands in South Dakota for the protection of prairie dog towns and black-footed ferrets.

The *Izaak Walton League of America*, as the name suggests, began by a rallying around the gentle art of angling but soon evolved into ecological understanding and now works for all of nature and the total human environment. It asserted early national leadership in fighting water pollution, a campaign that benefited game and nongame wildlife alike. More than any other organization the League was responsible for establishment of the Bureau of Outdoor Recreation in the Department of the Interior and also for the Land and Water Conservation Fund through which a great deal of wildlife habitat has been preserved in parks, refuges and public forests.

*National Audubon Society*. The first Audubon Society proclaimed its mission to be "the protection of birds not used for food." Thus from the beginning the Audubon emphasis was on the nonhunted species, although through the natural evolution of wisdom the Society became concerned with all classes of

wildlife and in fact with the total ecosystem. It has helped advance professionalism in game management and has not hesitated to speak out about the regulation of migratory game to the irritation of some hunting groups who believe the Auduboners ought to stick to the songbirds. As early as the turn of the century Audubon Societies were establishing sanctuaries and getting their wardens shot trying to protect breeding colonies of "plume birds" and other exploited species. They have carried on extensive educational programs designed to change public attitudes and introduce the concepts of ecology. Audubon research has included classic studies of the biology and ecology of the whooping crane, roseate spoonbill, California condor, bald eagle, and other endangered species. Going beyond birds, the Society has contributed to studies of rare and endangered reptiles and mammals and is currently helping finance an effort to reestablish the timber wolf in northern Michigan. Together with its chapters and affiliates, the National Audubon Society has been the leader in bringing about protection for the birds of prey. It is currently heavily engaged with the National Wool Growers Association in a seesaw battle over the fate of the coyote.

The *National Wildlife Federation*, whose claim to be the nation's largest conservation organization would be difficult to refute, carries on a program so broad and comprehensive as to defy summary in a short space. The organization built itself on funds from the sale of Wildlife Stamps that featured nongame species, even wild plants, in reasonable, natural proportion to the game animals. Its publications appear to devote more than proportional attention to nongame, probably in recognition of the interests of the general public as distinct from hunters and anglers. Through grants to graduate and post-graduate investigators, the Federation has supported research on such nongame subjects as cotton rat populations, birds of the Giant Sequoia forest, the pocket gopher, osprey problems, the ecology of sea birds in northern Puget Sound, a desert rodent community, and the eastern woodrat. Last year the Federation launched a new "Wildlife to Your Backyard" promotion, a program in habitat creation, and to date has distributed more than a quarter-million how-to-do-it reprints from its magazine *National Wildlife*. This year, for the second time, conservation of endangered species was the theme of the Federation-sponsored National Wildlife Week.

The *Wildlife Management Institute*, sponsor of this annual conference, views all wildlife as members of biotic communities. According to Dr. Laurence R. Jahn, Vice-President, "The classification of game and nongame is for convenience only. It is not useful in dealing with ecosystems." The Institute's philosophy is reflected in this session and in the fact that technical sessions on the plight of threatened and endangered wildlife have been held three times in recent years. Despite the well-known fact that its funds come largely, if indirectly, from the sporting arms industry, books published by the Institute have included among the titles: *Hawks, Owls and Wildlife*, by John J. Craighead and Frank C. Craighead, Jr.; *The Clever Coyote*, by Stanley Young and Hartley Jackson; *Wolves of North America*, by Stanley Young and Edward Goldman; *Birds of Alaska*, by Ira N. Gabrielson; and *The Puma, Mysterious American Cat*, by Stanley Young and Edward Goldman. Nongame species also have been the subject of some of the research assisted by WMI through the Cooperative Wildlife Research Units.

*The Wildlife Society*, an association for professionals in wildlife management, research, administration, and education, is co-sponsor with the International Association of Game, Fish and Conservation Commissioners of the model law for nongame and endangered wildlife. In other speeches and writings I have cited this as evidence that a new day is dawning. The profession is ready and eager to take care of the nonhunted as well as the hunted species. The broadening interest of the profession, its growth in ecological understanding, is reflected also in the increasing incidence of titles dealing with non-game species in the Society's *Journal of Wildlife Management*. The Society defines wildlife as including "all forms of animals, harvestable and nonharvestable, vertebrate and invertebrate, and gives much attention to their habitats, this including consideration for plants and the air, soil, and water that support them. Research has shown that animals and their habitats are interlocked and cannot properly be considered separately."

The *Wilson Ornithological Society* has had an active conservation committee as long as I can remember and its reports, as well as the innumerable bird studies it has published, appear in *The Wilson Bulletin*. Most of the published studies have been about nongame birds for the natural reason that among Aves, as in other classes of the vertebrate world, there are far more nongame than game species. Currently the Wilson Society's conservation committee is concentrating on two problems: the relationship of crop depredations and open seasons on the sandhill crane; and the adequate enforcement of eagle protection laws in the western states.

DEPARTMENT OF WILDLIFE ECOLOGY

February 20, 1974

Mr. Charles H. Callison  
National Audubon Society  
950 Third Avenue  
New York, NY 10022

Dear Charlie,

George Watson has informed me that he has answered your inquiry of 13 February to American Ornithologists' Union.

In general, the society's committees (on bird protection; or in more recent years, conservation) have simply served to alert readers of *The Auk* annually on bird conservation problems. The committee that I appointed in 1972 was asked by me to confine its review entirely to "Bird Protection in Middle America." The report generated some resolutions at the annual meeting of the society last October.

A good history of bird protection 1883-1933 is given in the A.O.U.'s publication "Fifty Years' Progress of American Ornithology." The A.O.U. had an active action program in conservation which led to the inauguration of the forerunner of the Bureau of Biological Survey in 1885 and the National Association of Audubon Societies in 1905. Since their start, A.O.U.'s role in conservation has been strictly minor.

I am glad to hear that nongame species are finally going to receive some attention at the North American. Their absence at that meeting has certainly been conspicuous.

Sincerely,

Joseph J. Hickey  
Professor of Wildlife Ecology

THE AMERICAN ORNITHOLOGISTS' UNION

19 February 1974

Mr. Charles H. Callison  
Executive Vice President  
National Audubon Society  
950 Third Avenue  
New York, New York 10022

Dear Mr. Callison:

The American Ornithologists' Union exists largely to encourage research through offering free publication to investigators. This has been through *The Auk* and in recent years the A.O.U. monograph series. It has sponsored by funding on a modest scale research under the Van Tyne Awards. Neither of these has really been a directed conservation program, but each has contributed to conservation of species and habitats by drawing attention to problems.

More conscious conservation efforts of the A.O.U. are the reports of its Conservation Committee which are usually published in *The Auk*. I recommend that you look through *The Auk* for Conservation Committee reports such as that in 1973.

Lastly, at our annual meeting we pass resolutions calling the attention of public officials and private businesses to pressing conservation problems. You can check some of these resolutions by reviewing the Proceedings of the Stated Meetings usually published in the January *Auk*. I am sending you copies of the relevant 1973 Resolutions, all of which have been distributed as stated.

In short, our conservation efforts as an organization are diverse and generally not continually focused. But because we are the major professional ornithological society in this country, our recommendations are frequently sought or followed.

Sincerely yours,

George E. Watson  
Secretary

AMERICAN SOCIETY OF ICHTHYOLOGISTS  
AND HERPETOLOGISTS

February 14, 1974

Charles H. Callison  
Executive Vice President  
National Audubon Society  
950 Third Avenue  
New York, New York 10022

Dear Mr. Callison:

In answer to your letter of 11 February requesting a summary of our conservation activities, I enclose copies of the reports of our Environmental Quality (formerly Conservation) Committee for the last five years. This should give you an idea of how we have attempted to put our concerns over rare and endangered species into action.

I am also sending a copy of your letter to the present chairman of our Environmental Quality Committee, Dr. F. Wayne King [Department of Reptiles, New York Zoological Park, 185th Street and Southern Boulevard, Bronx, New York 10460] so that he can give you some more recent information.

Sincerely,

Bruce B. Collette  
Secretary, ASIH

AMERICAN SOCIETY OF MAMMALOGISTS

February 19, 1974

Mr. Charles H. Callison  
National Audobon Society  
New York City, NY 10001

Dear Mr. Callison:

As you know, the principal function of the American Society of Mammalogists is to publish the Journal of Mammalogy. We also conduct an annual business meeting, and one of the important activities at the annual business meeting is the passing of resolutions. Over the years many of our resolutions have dealt with the matter of rare and endangered species, the protection of the environment, and similar matters directly related to the welfare of terrestrial or marine members of the class mammalia. These resolutions are forwarded to appropriate governmental and state agencies, and to the appropriate representative in foreign countries as well. The resolutions are published in the last issue of the Journal in each calendar year. Should you desire, you could go through the Journal file in your Society library and abstract whatever resolutions you need that would serve the purpose mentioned in your letter of February 11. We would be happy to see these resolutions used in this way.

Having served the Society as its Secretary for the past 16 years I can assure you that when the Society speaks, agencies listen. We have had many fine responses to the topics of our resolutions over the years.

Sincerely yours,

Bryan P. Glass  
Secretary-Treasurer

AMERICAN SOCIETY OF MAMMALOGISTS

February 19, 1974

Mr. Charles H. Callison  
Executive Vice President  
National Audubon Society  
950 Third Avenue  
New York, N.Y. 10022

Dear Mr. Callison:

Your letter of February 11 concerning the role of the American Society of Mammalogists in conservation programs is at hand. The ASM has for many years been concerned with conservation of the endangered mammal species, principally through its standing committee on Conservation of Land Mammals and its standing committee on Marine Mammals. It is through these two committees that resolutions are generated each year by the Society concerning endangered mammals, the resolutions being forwarded to all the appropriate individuals and agencies concerned. Each resolution is printed in full in the minutes of the annual meeting of the Society which appear in the November (no. 4) issue of the *Journal of Mammalogy* each year. You may wish to consult several of these issues from the last few years to gain some appreciation of the kind of resolutions sponsored by the Society.

I am enclosing a xerox copy of resolutions published in the November 1973 issue of the *Journal*.

I trust the information that the ASM maintains two standing committees, both of which are principally concerned with conservation of endangered mammals, and the enclosed example of their labors, will provide you with the necessary information for the paper you are preparing for presentation in Denver later this spring.

Most sincerely yours,

J. Knox Jones, Jr.  
Dean



COOPER ORNITHOLOGICAL SOCIETY

February 19, 1974

Mr. Charles H. Callison  
National Audubon Society  
950 Third Avenue  
New York, New York 10022

Dear Mr. Callison:

About four decades ago when the use of thallium was invoked as a poison for rodents the Cooper Ornithological Society took a vigorous stand against the indiscriminate use of this cumulative poison. It was a joint effort with the Museum of Vertebrate Zoology and the Northern Division of the society. The leaders in the protest movement were Joseph Grinnel, E. Raymond Hall and Jean M. Linsdale. The latter served as chairman of an investigative committee for the society and authored two reports, the first in 1931: Facts concerning the use of thallium in California to poison rodents—its destructiveness to game birds, song birds and other valuable wildlife. *Condor*, 33:92-106; the other in 1932: Further facts concerning losses to wild animal life through pest control in California. *Condor*, 34:121-135.

Nothing has been done to my knowledge by the society since that time except that recently A. Starker Leopold was appointed as the society's spokesman on endangered species.

Hope this will be of some assistance.

Sincerely,

William H. Behle

DEFENDERS OF WILDLIFE

March 14, 1974

Mr. Charles H. Callison  
Executive Vice President  
National Audubon Society  
950 Third Avenue  
New York, NY 10022

Dear Mr. Callison:

Although our thoughts and efforts are constantly focused on "threatened" and "endangered" species, it is in our DEFENDERS OF WILDLIFE NEWS that they receive our specific treatment frequently.

I think the items "Aravaipa Preserve" and "Prairie Dog Towns" in South Dakota will interest you.

We are grateful indeed for the wonderful leadership you and the NATIONAL AUDUBON SOCIETY are giving us all.

It is good to hear from you again.

Sincerely yours,

Mary Hazel Harris

## THE IZAAK WALTON LEAGUE OF AMERICA

March 19, 1974

Mr. Charles H. Callison  
Executive Vice President  
National Audubon Society  
950 Third Avenue  
New York, New York 10022

Dear Charles:

The League's current policies on non-game wildlife is intertwined among several basic positions on wildlife management, predator control, and rare and endangered species preservation. The following, in essence, is our intention and commitment to a national League policy on non-game wildlife.

“Non-game wildlife are no less unique, beautiful, or valuable than species which we classify as game animals. They have their place in the chain of life, and if any of them were to disappear, the earth and ourselves would be that much poorer for it. Non-game animals need protection from our burgeoning technology. Pesticides, bulldozers, draglines, plows and harrows are a constant threat to these creatures. There is a need for a national program of proper identification of the numbers and values of non-game species, and management programs should be allowed to grow from this research.

“We want to stress that management should be undertaken only with the best scientific and biological data which can be obtained. Primary stress should be directed toward habitat protection and restoration. Economic importance and “usefulness” should never be a prime consideration in management. Special emphasis should be placed on those species that are rare and endangered. International treaties should be vigorously sought to provide the most extensive protection. Non-game animals are as important to the quality of our natural environment as other forms of wildlife and they deserve our notice and protection.

Our expanding environmental consciousness has served to make us aware that each creature, large or small, huntable or non-game, is an integral brick in the foundation of the universe. Removing one brick may bring down the “oikos” upon us.

Sincerely,

Raymond C. Hubley, Jr.  
Executive Director

NATIONAL WILDLIFE FEDERATION

February 15, 1974

Mr. Charles H. Callison  
National Audubon Society  
950 Third Avenue  
New York, New York 10022

Dear Charlie:

Your urgent letter of February 11, 1974, arrived in the last mail last night and, after checking with Larry Jahn and ascertaining that you do have additional time, this response is being put together on a "crash" basis.

You ask about what we are doing. Consequently, I am providing all of the information that we can muster, confident that you will not feel that we are trying to "toot our own horns" (unduly) or to snow you. Rather, we know you will be selective in what you use.

Here are some thoughts about our efforts in the nongame wildlife arena, in no particular order of importance or priority:

1. NWF feels that it is in business for the basic purpose of working for the overall welfare of wildlife resources, relying entirely upon the advice of professionals trained in our Nation's best educational institutions and backed by years of experience in the field. Professional wildlife management, as so determined, includes complete protection on those which require it and/or harvesting of those suitable species which are in surplus supplies. As with your organization, our efforts more frequently take the form of protecting and enhancing habitat through combating pollution of various sorts.

2. National Wildlife Week: This year, for the second time, the theme of National Wildlife Week is featuring endangered species. I am sure you recall the many press and radio-TV efforts which we expend in this observance. This year, as something different, we bound the poster into the February-March issue of NATIONAL WILDLIFE Magazine and in April-May, the entire issue will be devoted to endangered species. This is the first time in the 12-year history of the Magazine that an entire issue has been devoted to one subject.

3. Throughout the NWF history, Wildlife Conservation Stamps have featured nongame as well as game species of wildlife. These stamp distributions now go to 12,000,000 sheets per year.

4. All of our publications cover nongame species. Articles and art work in NATIONAL WILDLIFE, INTERNATIONAL WILDLIFE, and RANGER RICK Magazines regularly feature song birds, amphibians, fish, and other nongame creatures. CONSERVATION NEWS and even CONSERVATION REPORT cover them as well.

5. National concern about these was reflected in resolutions adopted during our annual conventions (see attachments). The resolution in 1970 may contain some funding principles that you would want to highlight in your panel discussion.

6. We have developed a set of "Wildlife Notes" which are used to handle the large volume of requests for information. Samples are attached and you can see that nongame species are covered.

7. We have specifically gone to bat for nongame species with campaigns to boycott Russian and Japanese products until those countries cooperate on a whale moratorium; in persuading the Defense Department to forego use of wolf pelts on military parkas; and offering financial awards for information leading to the conviction of persons who kill eagles.

8. We are well into a Backyard Wildlife Habitat program. More than one-quarter million reprints of an article entitled "Invite Wildlife to Your Backyard", from NATIONAL WILDLIFE, have been distributed. More than 200 backyard habitats have been certified by NWF (recipients get certificate suitable for framing plus a press release to local newspapers). The initial idea was publicized in more than 250 newspapers. The State of Oregon is distributing 10,000 of these kits as part of the current National Wildlife Week observance. Jaycees are including the idea in their environmental program promotion going to 6300 units. Garden Club groups have adopted the idea for special projects.

9. A new nature trail, featuring opportunities to view wildlife generally, is being arranged by a naturalist at our new Laurel Ridge Conservation Education Center.

10. NWF is launching a new Land Heritage Program, details of which are carried in the December-January, 1974, issue of NATIONAL WILDLIFE Magazine which is contained in the material being sent you.

11. We have sponsored an annual "EQ Index" which gauges the status of wildlife. A similar effort was devoted to the International or "World EQ", a copy of which is attached.

12. NWF sponsored the symposium in Stockholm in 1972, "Uniting Nations for Biosurvival", and nongame wildlife was featured here as well.

13. Many of our Conservation Safaris (nonhunting or camera trips) feature nongame wildlife. For example, the Safari Tour to South Africa almost entirely features nongame wildlife.

14. The Conservation Summits feature sessions and birds walks.

15. As you pointed out, many of our research grants feature nongame wildlife. The packet of information contains summaries of those which are applicable.

This will have to do in view of the time available. Aren't you guys doing *anything*?

Kindest regards,

LOUIS S. CLAPPER  
Conservation Director

Enclosures

WILDLIFE MANAGEMENT INSTITUTE

February 15, 1974

Mr. Charles H. Callison  
National Audubon Society  
950 Third Avenue  
New York, New York 10017

Dear Charlie:

We appreciate the abstract for your presentation at the North American Wildlife and Natural Resources Conference. Kindly send the manuscript as soon as it is finished.

The attached statement highlights some of the Institute's activities and contributions to wildlife. Frankly, as I stated in Columbia, we view all wildlife as members of biotic communities. The classification of game and nongame is for convenience only. It is not useful in dealing with ecosystems.

We look forward to seeing you in Denver. With kindest regards.

Sincerely yours,

Laurence R. Jahn  
Vice-President

THE WILDLIFE SOCIETY

March 18, 1974

Dr. Charles H. Callison  
Executive Vice President  
National Audubon Society  
950 3rd Avenue  
New York, NY 10022

Dear Charlie:

Yes, The Wildlife Society has definite interests in the nongame wildlife arena.

As you know we joined with the IAGF&CC to prepare the model law draft for nongame funding now being adopted by state legislatures.

We have a standing committee working in this area, as well as a closely-related one on International Affairs, and we have formal position statements on "Endangered Species" and on "Exotic Animal Introductions."

Also, we worked, with others, to make the 1973 Convention on Trade in Endangered Fauna and Flora a success.

Further, you may be interested in our definition of "wildlife": Wildlife includes all forms of animals, harvestable and nonharvestable, vertebrate and invertebrate, and gives much attention to their habitats, thus including consideration for plants and the air, soil, and water that support them. Research has shown that animals and their habitats are interlocked and cannot properly be considered separately.

Most sincerely,

Fred G. Evenden  
Executive Director

THE WILSON ORNITHOLOGICAL SOCIETY

15 February 1974

Mr. Charles H. Callison  
Executive Vice President  
National Audubon Society  
950 Third Avenue  
New York, New York 10022

Dear Mr. Callison:

I have no archives or similar documents here that would enable me readily to compile for you a history of conservation activities of the Wilson Ornithological Society.

We have long had a Conservation Committee; needless to say, the rate of activity of this Committee has fluctuated over the years, depending on the interest and dedication of the Committee's membership at the time. Reports of this Committee have been regularly published in *The Wilson Bulletin*—my only means of summarizing its history would be to go back through the volumes of the *Bulletin*, and I'm sure a set must be available to you in order to do the same thing.

Over the years, I need hardly say, many of the officers and members of the Wilson Ornithological Society have made important contributions to the conservation of wildlife, both in professional capacities and as interested citizens.

The current Chairman of the Society's Conservation Committee is Dr. Clait E. Braun, Wildlife Research Center, P.O. Box 2287, Fort Collins, Colorado 80521. At my specific request, his Committee for 1973-1974 is composed of specialists studying two problems: the question of crop damage, open seasons, etc. with respect to the Sandhill Crane in the western states and provinces; and the question of adequate enforcement of eagle laws, also in the west. The previous Committee, under the chairmanship of Dr. Gustav Swanson, concentrated on conservation problems of the Pacific Islands.

I'm sorry I am unable to provide you with more of the information you require, but the relevant reports should be easily accessible to you.

Sincerely yours,

Kenneth C. Parkes  
President



# Contributions of the Universities to Nongame Wildlife Policies, Programs, Progress

Gustav A. Swanson

*Head, Department of Fishery & Wildlife Biology  
Colorado State University*

Your image of the role of the university naturally depends upon your particular background and outlook, and these vary widely within the same group. Some students in Colorado colleges and universities consider them merely a convenient base for going skiing, but most are after an education. Some faculty feel that the university would be a fine place if it wasn't for all the students, but I'm convinced that most are genuinely interested in the students.

Some parents consider the university chiefly as an appropriate institution where they can consign their children for four years, and do not realize that universities no longer consider it their responsibility to act *in loco parentis*.

After spending over 30 years of my professional life at four different universities I may be accused of being biased, but I am willing to make a categorical statement. The progress of nongame wildlife management will depend significantly upon the extent to which the universities participate and provide leadership.

This is certainly not a startling idea if we think of what happened in other fields. The initiation of forestry programs in a whole group of American universities around 1900 gave the profession of forestry the momentum that it needed when a large number of national forests were being created with needed professional management and administration.

In game management the same development occurred about 35 years later. A number of universities established professional game management training programs just in time to provide the increasing number of game biologists and managers needed by federal and state wildlife agencies in the late 1930's.

The term nongame is a catchall but as far as public interests are concerned four loosely defined and somewhat overlapping categories of wildlife include the great majority: *songbirds, raptors, rare and endangered species*, and those requiring *control*, under some circumstances. Each of them has generated its own enthusiasts (or enemies), but "rare and endangered species" captures the public at large. The pupfish was known only to a handful of ichthyologists until it was blessed by the Department of the Interior as an endangered species. Now it is a household word.

By the early 1970's we have become aware of several important developments which will influence our progress in nongame wildlife conservation in North America. The surge of public concern for the environment beginning in the mid-60's has included a particularly rapid increase in interest in wildlife, and this has been especially strong for the nongame component. Wildlife is rather generally recognized as a barometer of environmental quality, *i.e.*, destruction or degradation of wildlife habitat is bad for people too.

Although this exploding public interest in nongame wildlife has been obvious, official actions and programs have fallen far behind the needs. While it is true that there have been many gratifying developments in legislation and regulation, they have often been less than effective because funds and research and trained manpower were inadequate.

*Funding.* Funding for wildlife conservation programs is still largely from the hunter and fisherman under our well-established tradition in this field that "the user should pay." As a result the official programs naturally give emphasis to game rather than nongame, and this influences employment, and hence the professional training in the universities. If we look into the future, however, it seems likely that changes will occur, albeit more slowly than we would like. If the sources of funding change, it will also swing the conservation programs, and the employment, and the professional training. And there are important changes in progress.

Funding changes which have occurred or are in prospect include the following, all of which will, in time, influence university wildlife programs:

1) Many states have begun in a small way to use their regular game fund and federal aid sources for nongame wildlife programs. McKean (1971) reported that for '71 - '72 this totalled, for the 50 states, nearly \$400,000 for developments and \$600,000 for control. Thus far the employment of personnel for nongame wildlife work, except for control, is minimal. We know of 8 states which have one or more full-time nongame biologists, but almost all of them have been reassigned from previous duties as game biologists.

2) Many states have begun to spend general tax funds for nongame wildlife work, but thus far this is chiefly for control of predators and other species causing damage (McKean 1971).

3) Some states have turned to unusual forms of income since efforts to secure general tax revenue were unsuccessful. These are so recent that their potential as income-producers is still unknown, but other states should observe and consider them.

a) The State of Washington, by a referendum which passed by a two to one vote, authorized the voluntary sale of personalized auto license plates at an initial cost of \$32.50 and annual renewal of \$20. This income is earmarked for nonhunted wildlife, including rare and endangered species. California began a similar program in 1970, but the income (of about \$3 million in 3 years) is available for a variety of environmental programs. However, this year the California Department of Fish and Game gets \$539,000 from it for acquisition and development of 14 areas of ecological significance, including habitat for rare and endangered species.

b) Colorado initiated in 1973 a nongame wildlife stamp costing \$5. It confers no privileges on the buyer but gives him opportunity to contribute to nongame wildlife work and is tax deductible. The concept is generally approved by the public, but thus far there have been only token sales.

c) Missouri in 1971 and 1972 proposed an amendment to its constitution to authorize a 1-cent bottle tax on soft-drinks to finance an expanded conservation program which would greatly increase its nongame wildlife work. It was expected to produce \$15 million/year, and over 158,000 persons signed the petition to place the proposal on the ballot. The petition, however, was ruled

technically ineligible because it did not include the required enacting clause, so it has never come to a vote, and the proponents have not thus far been able to develop the momentum a second time.

d) Possibilities of new and unusual sources of funding for nongame wildlife programs have been proposed by several speakers at the 1971 meeting of the International Association of Game, Fish and Conservation Commissioners (Hatter, MacMullen, Poole, and Schneider, all 1971) so those interested in such matters should consult these presentations.

e) Finally, the Rare and Endangered Species Act of December 28, 1973 includes authorization for federal cost-sharing with states for approved programs in this area. Single-state approved programs are eligible for 2/3 federal cost sharing, and joint programs involving 2 or more states for 3/4. Like earlier federal aid acts, this one could have a very important and far-reaching influence.

Funding aside, what have the universities been doing, and what can they do in the future, to stimulate more rapid progress? The three traditional functions of the American Land Grant University system all apply—teaching, research, and extension—and I shall describe some examples from each.

*Teaching.* There are, of course, hundreds of university courses in ornithology and mammalogy which deal with the biology of nongame birds and mammals, but in the teaching of formal coursework on nongame wildlife *management* the universities have frankly lagged behind the needs. At Colorado State University we initiated such a course this year, taught by Dr. Ronald A. Ryder, and the enrollment was so high that the course is being given three times this first year, twice on the Fort Collins campus and once evenings in Denver. If any of you from other universities are interested in considering initiating such a course, Dr. Ryder would be glad to send you a copy of his outline and a set of the handouts he furnishes the students. There is no text available, naturally, but for the segment dealing with management of songbirds he requires the attractive little paperback *The Hungry Bird Book* by Arbib and Soper.

The status of knowledge on management of nongame bird populations (except for those which become pests of one kind or another and for which, therefore, the management is to limit or disperse the populations) is quite incomplete and inadequate in the United States, but less so in Great Britain and Western Europe. There is even an International Union of Applied Ornithology, established in 1954, with its own journal, *Angewandte Ornithologie*, which deals extensively with management of nongame birds, both with means of increasing their numbers for enjoyment and as controls of insect pests, and with means of reducing the damage which some forms, e.g., starlings, do to vineyards and other crops.

In the United States there appears to be a very large amount of unpublished information representing experiences of individuals and organizations in improving the environment for nongame birds, particularly song birds. A major effort will be required to assemble this unpublished information in a form that will be useful for a university course, as well as for a basis for further research in this developing area. Much of the information available, while unpublished and usually not quantitative, will contribute importantly to the subject when assembled, but it clearly will be a major job to locate and assemble this information.

We were therefore delighted that the National Audubon Society has made a travel grant to Dr. Ryder to permit him to visit a number of locations in the U.S. and Europe to assemble information in his major effort to develop those portions of the course for which the existing scientific literature is scanty, and where personal observation and conferences are especially important.

One example is Birdsong Plantation near Thomasville, Georgia, the home of Edwin and Betty Komarek. For 25 years the Komareks have successfully practiced numerous management measures for increasing the numbers, attracting and observing birds and mammals around their home, with astonishing success, but they have published nothing on their rich experiences. If any of you in the audience have similar places in mind which it would be desirable for Dr. Ryder to visit during the coming year, he or I would appreciate hearing about them.

The initiation of Dr. Ryder's course is only a start, but an important one, since as far as we have been able to learn it is the first of its kind in an American university. We expect there will be many others, so that graduates, both those aspiring to become professional wildlife biologists and the non-professional as well, will have an increased appreciation of the extent to which the principles of wildlife management, developed chiefly for game, can also be applied successfully to nongame.

*Research.* The universities have been active in research applicable to some aspects of nongame wildlife management and will, of course, be able to do much more where funding becomes available. I shall mention only a couple of outstanding examples.

At Cornell University the efforts of Professor Tom Cade and his colleagues are outstanding in the development of successful methods for producing and rearing peregrine falcons in captivity. The 1973 breakthrough, resulting in the rearing of 20 peregrines, attracted worldwide attention. It now begins to appear probable that captive-reared peregrines will be available for experiments in establishing nesting pairs in suitable locations where they have long been absent.

In the studies of effects of chlorinated hydrocarbons upon the populations of many species of birds and particularly on their reproduction, which led finally to the banning of the widespread use of DDT and other related pesticides, university contributions played a very important role. The work in this area of the Bureau of Sport Fisheries and Wildlife was also critical, of course, but university efforts in many parts of the country added tremendously to the weight of evidence and hastened the adoption of regulatory measures. Some of this research was funded by the Bureau contracting with the universities. The work of Professor Joseph Hickey and his students at the University of Wisconsin is the outstanding example.

*Extension and Public Service* is also a recognized responsibility of the Land Grant Universities, one which can have a significant influence on the adoption and growth of nongame wildlife management. Several recent conferences on specific aspects of nongame wildlife have contributed significantly.

The 1965 International Conference on Peregrine Falcon Populations, their biology and decline, organized by Prof. J. J. Hickey at the University of Wisconsin is the very best example. The conference itself and the published book of proceedings from it did more than any single event to marshal the

evidence of a worldwide decline, consider the possible causes, and stimulate the research which ultimately proved the effects of DDT.

Eight years later, in March 1973, Colorado State University and the Raptor Research Foundation sponsored a conference on Raptor Conservation Techniques which attracted over 200 participants from throughout Canada and the U.S. Population status and breeding biology of raptors were also considered, but the emphasis was upon recent progress in the development of conservation techniques in North America. The proceedings are being published by the Raptor Research Foundation at the University of South Dakota at Vermillion.

Three other significant conferences have been held during the past five months, so the pace seems to be quickening!

The University of Massachusetts sponsored in November 1973 a conference on Wildlife (and its management) in an Urbanizing Environment.

In December of 1973, Kansas State University sponsored a Great Plains Workshop on Wildlife Damage Control which was attended by nearly 100 professional people from universities and state and federal agencies.

Finally, in March 1974, the University of California at Davis sponsored an international conference, the Sixth Vertebrate Pest Conference, a meeting which attracted participants from as far away as Australia and South Africa.

These examples are only a few of the many conferences on nongame wildlife management which universities have held in recent years. They have the very important function of giving professional people in a specialized area an opportunity to compare notes and to be brought up to date on progress in that area, which is frequently not yet represented in the scientific literature.

More general extension activities, many of them concerned especially with youth groups, have been conducted from most of the land grant universities. At latest count, approximately 30 of the states have one or more full-time wildlife extension specialists, and a substantial proportion of their work is concerned with nongame wildlife, simply because the requests for information in that area are so numerous.

In summary, then, the Universities have already contributed importantly to the public interest and to the progress in nongame wildlife management in the past few years here in the U.S. with their research and extension activities, and are beginning to contribute in the teaching field. Their role will certainly continue to be an important one.

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# Preliminary Views on Nongame Wildlife Policy

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The ink was barely dry on Durward L. Allen's 1972 statement, "The Need for a New North American Wildlife Policy," when the Council on Environmental Quality and the U.S. Department of the Interior appointed yet another committee to provide management policy guidelines for the nonconsumptive uses of wildlife.

Allen was then already at work on a restatement of the 1929 Aldo Leopold committee report on American Wildlife Policy. There are interesting analogies here. Leopold was involved in two presentations. His 1929 report was addressed to wildlife policy needs; but in 1930, reporting for a slightly different committee, he addressed game policy needs. He was probably ahead of his times even here. Allen spoke of North American wildlife policy needs in 1972, and reported for The Committee on North American Wildlife Policy in 1973. I expect that the broadening of public awareness, and the consequent demand, in the conservation field will lead to the formation of new study groups to address world conservation needs before the ink is dry on this report. This is good because our growing awareness must be restated in stepwise fashion; we cannot yet visualize the guidelines necessary to make our vision effective.

The committee it has been my privilege to chair again includes Durward L. Allen and A. Starker Leopold, and two experienced state fish and game agency administrators, Carl N. Crouse of Washington, and Chester F. Phelps of Virginia.

I suspect that Tom Kimball's 1971 Salt Lake City talk to the Western Association of State Game and Fish Commissioners may have helped spark this latest committee. Kimball articulated the concern of state officials that wildlife professionalism itself was under attack, and that there existed "a growing tidal wave of sentiment which looks upon killing of any living warm-blooded organism as unnecessarily developing the base character of man, decreasing his sensitivity to desperately needed social change, and producing the image of the naked ape as nothing more than that—a cruel, despotic, inhumane outdoor slob, incapable, as long as he persists in his blood-thirsty pursuits, of appreciating the finer things of life." Kimball may not have agreed with this pungent characterization, but it is important that he recognized its existence.

It is a fact that a new wave of public awareness of the environment, and a consequent greatly broadened concern for wildlife, has swept the nation in the last five years. The rate of change imposed on American society by technological progress in the last generation is a sufficient cause of this new awareness because we should long ago have recognized that excessive change unsettles people. The resulting insecurity fosters questioning, and this delegitimizes established views, including our social priorities.

The crisis of the atom, rising environmental pollution, space ventures, the trauma of war, and, now, the energy crisis, and others—all of them monitored for us by the involving medium of television—have combined to force us to realize, however dimly, that ours is indeed one world, and that it matters very much to all of us what other people do to our environment. Although often labelled emotionalism by people impatient with its implied demands, this new interest is a healthy and commendable development of national consciousness. It is up to us to build on it.

As Kimball saw, however, it poses a dilemma for wildlife professionals:

1) For over a generation now, the wildlife management profession has sought to maximize the production of game species. By dint of an almost exclusive concentration on this one objective, wildlife biologists have successfully perpetuated several chosen species in the face of increased hunting and fishing pressure and a loss of habitat. This is what the 1930 Leopold report called for, and by and large it was accomplished. Organized sportsmen and the wildlife agencies at state and federal level have been understandably, but perhaps too smugly, proud of this accomplishment, because—

2) The emphasis on commodity production involved in selective wildlife management by conservation and agricultural agencies is a specialist's pursuit that leaves out of consideration too many other interests. It has created a growing polarization between traditional wildlife management programs and the growing demands of a broader public—especially in the urban regions, where most of the people now live—for a more inclusive conservation effort. New awareness imposes new responsibilities.

To resolve the conflicts that have crept into our traditions, therefore, we must ask more carefully what wildlife is for, and how our programs became unbalanced.

The American colonist, like early man everywhere, was nurtured on wildlife because early agriculture—in our case imported from Europe—was inadequate to our needs in food and fiber. An appreciation of this interdependence was well expressed in 1966 by a U.S. Senate Committee when it reported, "It can be stated unequivocally that our Nation owes much of its strength and tradition to a bountiful fish and wildlife heritage. The future would be far more appealing were there some assurance it would be built in harmony with nature and tradition."

But, as agricultural production improved and wildlife diminished, hunting and fishing became ritualized sports, not sustenance activities. The impact of these changes is realistically expressed by Edward L. Kozicky in a 1972 statement proposing model legislation for state nongame wildlife conservation programs:

In the family of American wildlife, the game animal is the rich uncle. It is studied, managed and greatly valued by professional conservationists and sportsmen. Millions are spent each year on the management and hunting of deer, waterfowl, pheasants, quail, rabbits, and other game species.

Then there are the poor relatives, the nongame species. They are no less beautiful or unique than the game species, nor less worthy of our concern. But because they are not hunted, they are not the objects of intense hunter-sponsored conservation programs.

And herein, I suggest, lies the rub, because, central to the new popular outlook is the dim awareness that the community of life is a single community. We must somehow learn to value it as a whole. We have not yet achieved this, but the alert citizen—now often in urban-suburban situations where hunting and fishing are less and less part of the social tradition—values wildlife, not as a commodity, but as the symbol of ecosystem functioning, as an index to the diversity of the environment, and as a measure of the quality of life. The rarer or the higher up on the ecologist's pyramid of numbers a species appears, the more it is esteemed. This is why the wolf, the eagle, and the whale mean more than rabbits, pheasants, or trout, and why we must protect the symbolic species if we are to continue managing the less involving forms.

Even the hunter and fisherman are now increasingly aware that they no longer merely seek food or recreation from their wildlife pursuits. It is noteworthy that while Durward L. Allen was restating the North American wildlife policy in 1973, a ground-breaking seminar on the sociology of wildlife management was taking place in another room at the same conference. This work showed that the sportsman now seeks a multiplicity of satisfactions from his field pursuits and that these contribute to a broader quality of life concept. This is an attitude, as emotional in its way as the concern for the perpetuation of whales, eagles, and wolves, but it is sound and deserves to be nurtured.

As A. Starker Leopold pointed out earlier, the game commission-game department-sportsman axis is a way of doing things we probably need to reexamine if it is to represent the broader public which now insists on having a voice in wildlife policy. Since it has been funded mostly by sportsman moneys, the commission-department structure has naturally been most responsive to sportsman interests in having more fish and game. Leopold concluded, "The problem is solvable if the democratic process will permit the 'establishment' to evolve in an effective and decisive manner to assimilate its full responsibility to wildlife in general and the public at large."

## **Funding**

Despite a variety of handicaps, including their dependence on sportsmen's license fees for operating revenues, the state agencies have recently shown great initiative in adapting to new demands for a broader wildlife protection program. But if these state fish and game departments are to become true wildlife conservation agencies and address the needs of total environments instead of a few species only, there will of course have to be additional funding for the enlarged programs.

Sportsmen have long demonstrated a willingness to be taxed in order to support the special programs they wished advanced. It is therefore logical to ask the increasing legions of people who use the outdoors for nonhunting and fishing purposes to pay similar taxes to help increase the funding of both state and federal wildlife conservation programs. If environmental awareness continues to permeate our society, the day should soon come when appropriations from the general fund will win approval for these purposes. Meanwhile a broad range of outdoor equipment might well be subjected to a federal excise tax, just as sporting arms and ammunition, fishing tackle, and pistols now are. Fortunately, the existing mechanisms for the administration of Pittman-



Robertson and Dingell-Johnson funds in the Department of the Interior are now both efficient and flexible enough to accommodate the proposed new program and taxes.

### **Recommendations**

The Committee is thus finalizing recommendations that may be stated in preliminary form, as follows:

1) That the Council on Environmental Quality work with the Department of the Interior and the Congress in drafting legislation, perhaps to be called The Nonconsumptive Wildlife Conservation Act of 1974, to provide additional annual federal tax revenues of not less than thirty million dollars;

2) That said revenues be obtained by new excise tax levies on outdoor equipment and supplies not now taxed specifically for the support of wildlife-related conservation programs;

3) That two-thirds of the new funds be distributed to the states on a matching basis; that the other third be allocated to federal land management agencies to broaden their nonconsumptive wildlife use programs; and that no more than 8 percent of the total be used for the administration of this program, this sum to come from the federal share already allocated;

4) That the states be required to provide matching funds from general appropriations or from income levies which do not further tax existing fish and wildlife program contributions; and

5) That the objective and result of this new funding shall be a more inclusive national wildlife conservation program, to include enhancement of wildlife values in urban areas wherever possible.

### **Panel Discussion**

**MR. BILL POTTER** [U.S. Forest Service, Seattle, Washington]:

I was very much interested in hearing Roland Clement's comments on the growing need for a multiplicity of satisfactions approach to wildlife management.

I have been very much a part of that effort and we are now faced with the question of what is our unit of measurement. In the past, we have had a fairly simple unit: the number of animals killed or the number of man-days in the field. Have you given any thought as to what might be an appropriate unit of measurement for a multiple satisfactions approach to wildlife management?

**MR. CLEMENT:** I have given thought, but I look to you young sociologists to evolve an answer to this problem.

Let me put this in a broader perspective. We are groping now for new criteria, new definitions of value and that sort of thing, and for the first time in two hundred years America is reconsidering its entire value system. What we are talking about right now is just a small part of the bag.

**MR. WAYNE GAUNIER** [Hawaii]: I would like to direct this to Mr. Clement, too.

I think we have to be a little careful in accepting the contention that hunting and hunting-related activities have not caused the extermination of any species. The oceanic island ecosystem has run onto a human iceberg, really, that stove in the side of human ecosystems. And I would contend that game animals that have been introduced into Hawaii, for example, and other oceanic islands, which is fostered by Pittman-Robertson Funds, has very likely caused the extinction of a number of plant species. Now I couldn't really gather that data even if I tried because it is after the fact. But we know that feral game and axis deer, and so on, have very seriously degraded some of our island ecosystems. So I think we have to pay close attention to the great disparity there is between island ecosystems and continental ecosystems in this respect.

MR. CLEMENT: I thank you for broadening the base. We are becoming aware that we have been talking in much too narrow terms. In other words, it is true that the sportsman himself has not eliminated any species, but, as you are suggesting, perhaps programs designed in his behalf may have done so. So let's take a look at it that way.

MR. RAY OWEN [University of Maine]: I am interested in how the Federal Government and some of the states are handling the problem of plant species and as they relate to rare and endangered species as compared to nongame wildlife, for instance.

DISCUSSION LEADER LOUGHREY: Would a state or federal representative like to take a crack at that?

MR. CROUSE: The states, by and large—and there may be one exception to this—have not entered into the problem of plant communities. With possibly one or two exceptions, I don't know of any state that is yet taking this into consideration. They are aware of changes and plant successions. Hawaii probably is the only state that has major problems in this. But I do not believe any state now has what I could consider active programs for endangered plant species.

DISCUSSION LEADER LOUGHREY: Lee, would you like to say something on the federal side?

DR. TALBOT: Very briefly. The Endangered Species Act of 1973 that was just signed does include plants. It literally includes almost all forms of life. One of the things it requires is that there be an inventory of endangered plants or plants and communities likely to become endangered. This is a very important development and distinction. This, in turn, calls for certain state activities. In fact, indeed it calls for all states ultimately to respond to this. Consequently, there is now a legislative mandate, and an authorization of funding, to begin to get this thing done.

In addition, a number of the federal agencies which manage land of one sort or another for about four or five years have been involved in a Research Natural Area Program in which they have been trying to identify the different ecosystems or habitats that exist within their areas and assure that samples were set aside essentially for research and as, in effect, land marks or ecological benchmarks. This program needs to be strengthened and we are working on that right now. It needs vastly more attention. But there is some mechanism for it now.

What will be greatly helpful, obviously, will be public support and concern for the plants as well as for the animals beyond the point of simply recognizing that plants are somewhat important because they are part of the habitat of the animals.

MR. CARL NOREN [Missouri]: I wanted to respond to a question regarding programs for plants as well as animals. Carl Crouse isn't aware, although we are frequently in communication, that we do have a program in Missouri which is concerned with plants, a natural area program. We have set about to classify all our holdings and select those that have unusual natural area qualities, including plants. We also have a program in cooperation with the largest landowner in Missouri. The Lab Foundation which he has set up transfers land to us for management, and this land frequently is oriented to the plant side of the natural picture.

DISCUSSION LEADER LOUGHREY: Thank you. Before we terminate this, I would like to ask Roland Clement if he would like to give us some views on options for funding nongame wildlife management.

MR. CLEMENT: I think Dr. Talbot properly reminded me that I may have left an impression that we did not fully address the question of funding. I did not bring this up because I thought it was covered so well by Carl Crouse and mentioned by almost everyone.

The point is where are we going to get the funds that are necessary to round out the program and give the states the wherewithal to do the larger job we are asking them to do. It's got to come from taxes. So what are the choices?

We have, therefore, the opportunity of putting on some new excise taxes, such as now exist on sporting arms and ammunition which give the sportsman the opportunity of funding the program that he has wanted over the last generation and more. This, of course, will raise many questions: What are the potential sources of new income from excise taxes? Which combination will be best, and which will be most politically acceptable?

If we don't put on another excise tax—and there certainly will be a good deal of

resistance to that unless we do a careful selling job in showing the public involved that this is for the common good—we do have another opportunity. This is to propose that there be a capital gains tax on land. The State of Vermont has provided a precedent in this area. They were so concerned about speculation in land up there, with land values skyrocketing out of sight, that they have put a special capital gains tax on land. I am very impressed with the potentials of such a tax and our committee has agreed that this should at least be looked at by the states as a potential source of funding. It has the great advantage that it will slow down land speculation and, therefore, slow down environmental destruction and make the total wildlife conservation job easier.

Now if we don't resort to these two approaches, then we must appropriate from the general fund, and this means that we must convince the politicians that not only does the public want this, but that the program deserves it because actually we now have new evidence that wildlife probably produces more cash flow than any other single natural resource for the amount of investment made. In other words, we are getting a tremendous economic feedback now from the wildlife resources that has not been appreciated in the past.

So what we are suggesting now is that there be a new source of funding, first at the federal level and then, secondarily, at the state level, to augment, if you will, to complement the existing Pittman-Robertson Funds; and essentially that this new enlarged program at the federal level be administered by the existing P.-R. office which is capable of handling an enlarged program; and then, of course, that the state fish and game agencies enlarge their programs as we fund them and make it possible.

**DISCUSSION LEADER LOUGHREY:** Thank you, Roland. And I would like to thank the members of the panel and also thank the audience. I don't think this is the end of the dialogue. I think it is the beginning of the dialogue to meet this very real challenge of public expectations for nongame wildlife.



# Seabirds—Alaska's Most Neglected Resource

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Seabirds are the most visible biological component of the marine ecosystem and at the same time one of the least well known. Ornithologists, wildlife managers, and marine biologists have all demonstrated the human frailty of being able to look without seeing. The problem is that "few marine biologists have given due weight to seabirds as components of marine ecosystems, and few ornithologists have also been oceanographers" (Ashmole 1972: 224).

There is no coordinated program for seabird management in North America. Management of seabirds in Alaska has historically been passive and piecemeal in nature and usually limited to the acquisition of lands for protection of breeding colonies. Even this protection has been generally directed towards the spectacularly conspicuous colonies of cliff-nesting species. The acquisition of breeding areas for those seabirds whose nest sites or habits are less conspicuous has been largely accidental. Management information has for the most part been haphazardly gathered, with investigations often being dictated either by the interests and orientation of the investigators or by the pressures of the crisis at hand.

Seabirds are found off Alaska's coast in such incredibly large numbers that it has been stylish to assume that all is well with them. A cursory look at the changing uses of the land and marine resources, however, suggests that such assumptions are not well founded.

Actual and potential conflicts with the development of other resources will ultimately force us to ask the question—"How many seabirds do we need?" Policymakers and managers will be confronted with this question shortly, but the answers may be long in coming.

Our purpose in this paper is to describe the nature of current and potential problems confronting seabirds in Alaska and to identify approaches to management and needed research that might alleviate these problems.

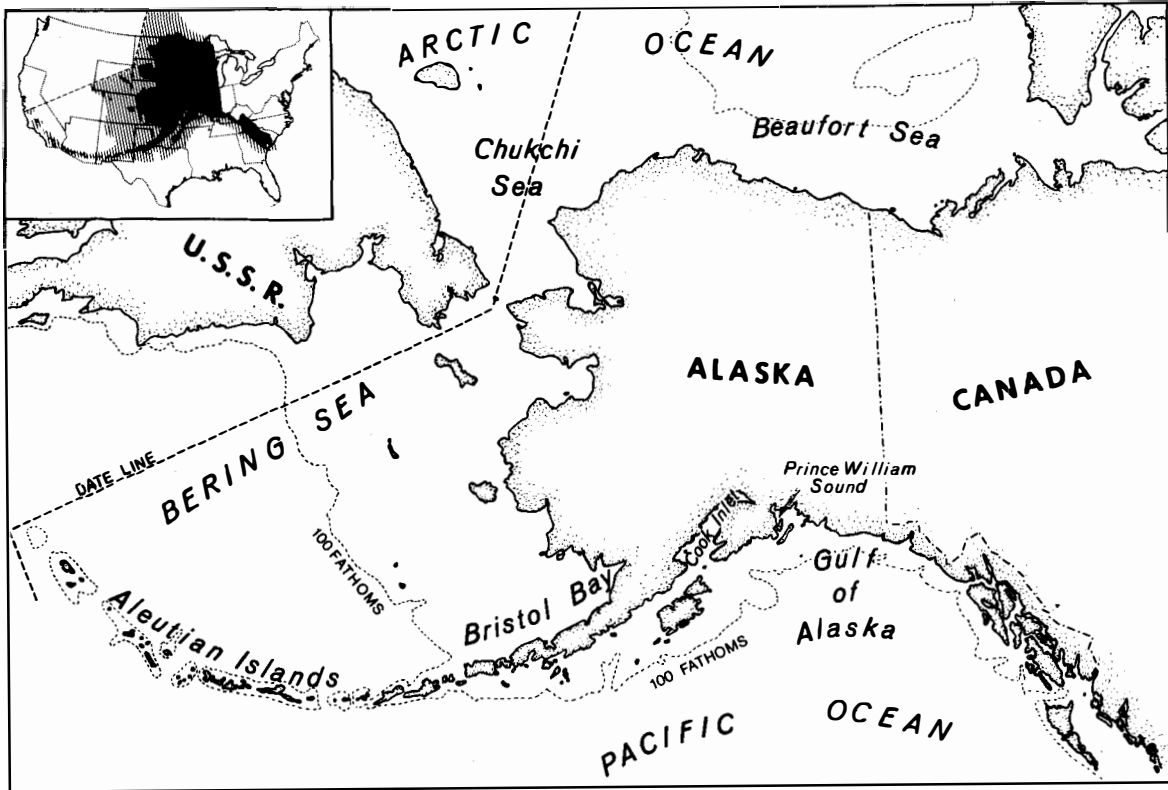
### **The Resource and the Habitat**

Alaska's seabird resource is numerically vast. How many seabirds there are is obscured by the limits of our knowledge. We cannot even define them in a way suitable to every context. In Alaskan waters there are between 55 and 95 species of seabirds depending on which groups are included or excluded. These include species breeding on Alaska's coast as well as those breeding in adjacent northern areas, in the Southern Hemisphere, and in the Central and Western Pacific.

Alaska is washed on three sides by two oceans, the Pacific and the Arctic, incorporating the Beaufort, Chukchi, and Bering Seas and the Gulf of Alaska (Figure 1). It has a tidal coastline 34,000 miles long and an associated outer continental shelf 550,000 square miles in extent, almost one-fifth the area of the conterminous United States. This vast coastal zone and continental shelf provide abundant breeding and feeding habitat for seabirds. The oceanic area beyond the edge of the shelf is also good seabird habitat. One problem that managers face in trying to preserve the breeding habitat of seabirds or the quality of their feeding habitat is that Alaska's seabirds have extremely diverse habitat requirements and the full implications of all their needs are still not known.

Fragmentary information concerning bird densities for certain areas at specific seasons of the year is beginning to add dimension to our knowledge of the size and distribution of Alaskan populations. It would be presumptuous to project that information into an estimate of the total numbers of seabirds in Alaskan waters, however. Accurate estimates of seabird populations are difficult to obtain because of the many species involved, each with their unique characteristics, and because of the logistical problems encountered in censusing.

Sanger (1972) estimated that there are about 8 million seabirds in the Subarctic Pacific Region in winter and 51 million in summer. We believe his estimates are conservative for offshore species and he does not include inshore and nearshore-ranging birds. Shuntov (1965) estimated the density of wintering birds in the Eastern Bering Sea to be 45 birds per square kilometer (117 per square mile) and the density around the Aleutian Islands and in the Gulf of Alaska to be 27 per square kilometer (70 per square mile). His data were based on counts at sea and did not include the nearshore waters where densities are known to be much greater. Sanger (1972) reported bird densities in the Western Subarctic Domain (Central and Western Bering Sea) of 69 per square kilometer (179 per square mile) during June. The numbers of seabirds tend to be greater eastward over the Continental Shelf because they concentrate in areas with the greatest productivity (Shuntov 1966). "Average" densities may be impressive, but local concentrations are often spectacular. Shuntov (1964) observed densities of 5,000 short-tailed shearwaters, *Puffinus tenuirostris*, per square kilometer (13,000 per square mile) in the Bering Sea in summer. We have observed from a boat an average of 1,500 shearwaters per



**Figure 1**  
**Alaska Marine Areas**

square mile along 81 miles of a single transect near Unimak Pass during early September.

### **The Value of Seabirds**

Any living thing, including a seabird, is endowed with certain intrinsic values. There is also a growing body of opinion that we have no right to extinguish life because there is no easily definable value to it. The values of seabirds, as a resource, have not been fully described either quantitatively or qualitatively. There simply has not been enough work done.

Seabirds transfer and recycle nutrients and energy between trophic levels and between regions of the ocean. The significance of this role in the marine ecosystem can only be surmised from a few conservative estimates such as Sanger's (1972) that birds consume from 0.6 to 1.2 million tons of food and return from 120,000 to 240,000 tons of feces into the Subarctic Pacific Region each year.

The economic value of Alaska's seabirds has not been assessed. We know that seabirds and their eggs once made a substantial contribution to the subsistence economy of Alaska's native population. In some areas of rural Alaska auklets and the eggs of the large seabirds are still relished as seasonal foods.

Fledgling short-tailed shearwaters are harvested commercially as Tasmanian mutton-birds on their breeding islands in Bass Strait. One-half million were harvested in 1968 (Serventy *et al.* 1971). This is the only known commercial harvest of seabirds frequenting Alaskan waters.

Seabirds could provide protein for nonnative as well as native diets on either a commercial or a subsistence basis. The possibility also exists that seabirds could help divert a portion of the sport hunting pressure from waterfowl. Sociological problems will probably arise from consideration of either possibility even if it is shown to be biologically feasible to manipulate seabird populations through these means.

As anyone can attest who has ever had the privilege of watching the antics of tufted puffins, *Lunda cirrhata*, near their colonies on a day when the sun is obscured and the air buoyant, watching seabirds is fun. However, relatively few birders are yet aware of the outstanding opportunities for bird-watching and photography associated with seabirds.

### **Interactions and Conflicts Between Seabirds and Uses of Other Resources**

#### *Fisheries*

Fish, seabirds, marine mammals, and men interact. We know this intuitively but can quantify the complex network of interaction only to a limited extent. The catch of commercial fish species is best known. Between 1965 and 1969 13.8 million tons were taken from Alaskan waters (Buck 1973). There has been some study of marine mammal predation on fish. We do not know the magnitude of harvest by consumers other than man. Nor do we have any way to assess the combined impact of all consumers on the system. Understanding the extent of interaction and competition among Alaskan seabirds, marine



mammals, and the various fisheries is an essential consideration in effective management of these resources.

The guano bird/anchovy fishery interaction in Peruvian waters is the best documented example of the results of mismanagement. In this instance the birds and fishermen are in direct competition at the same trophic level. Schaefer (1970) estimated the maximum sustained yield for the anchovy fishery could be achieved through an annual catch of 10 million metric tons. The catch in 1970 was 12.3 million metric tons (Idyll 1973). Schaefer estimated that each guano bird ingests 157 kilograms of fish annually so 4.7 million birds took 0.7 million metric tons of anchovies during the same time. El Nino, an irregularly occurring current anomaly which reduces the productivity of waters off the coast and drastically reduces the anchovy population, has been a complicating factor. The bird population, which prior to the anchovy fishery achieved peaks of 30 to 40 million birds, has been reduced to the point that Idyll estimated that as few as a million survived the 1972 El Nino. The anchovy catch for the same year dropped to 4.5 million metric tons.

In Alaskan waters, Murie (1959) has raised the possibility that the virtual disappearance of the ancient murrelet, *Synthliboramphus antiquus*, from Sanak Island was due as much to exploitation of the surrounding fishery as the introduction of foxes.

There is mounting evidence of a rather substantial seabird mortality in the North Pacific from the Japanese salmon gillnet fisheries. The extent of the mortality is presently only crudely defined but the losses may be significant. An extensive longline fishery presumably introduces an additional increment of mortality. Lost and discarded gillnet and trawling gear add to an unknown extent to the size and duration of this mortality. Seabirds primarily murre, puffins, and shearwaters, originating from at least six nations (United States, Japan, Chile, New Zealand, Australia, and the Soviet Union), are involved. Many of the murre and puffins being netted must surely come from the Aleutian Islands National Wildlife Refuge.

We do not know the affinities between netted birds and specific breeding populations; therefore, it is impossible to assess the impacts of these losses on birds of a given origin. If, however, the bulk of the murre and puffins being killed are coming from breeding populations in the Western Aleutians it is unlikely that these populations can sustain this loss indefinitely. It is, therefore, essential that ways be explored to reduce the number of birds lost to the gillnet fishery.

From the viewpoint of some fishermen there may be too many seabirds. Some species are known to prey on commercially important stocks, e.g., salmon smolt and herring. The impact of seabirds on some commercially important fish stocks may prove to be significant.

### *Petroleum*

Most of the area of Alaska's Continental Shelf lies within one potential petroleum province or another. Cook Inlet is already being developed. The Gulf of Alaska has been the site of intensive exploratory activity in recent years and hearings have been held relative to oil lease sales. At full capacity, the Trans-Alaska Pipeline will add 2 million barrels of oil per day to that already

being transported across the Gulf. Other pipelines terminating at ports on the North Pacific will be built as new fields are developed elsewhere in Alaska and in Canada and Siberia.

Water birds, water, and oil are an incompatible combination. Many spectacular oil shipping disasters have been reported in recent years. Some of these have killed large numbers of seabirds. Chronic pollution, however, has much greater impact than does the spectacular but relatively short-lived spill. Total annual loss to chronic oil pollution in the North Atlantic and North Sea has been estimated to range from 150,000 to 400,000 seabirds (Tanis and Morzer Bruijns 1969, cited by Nelson-Smith 1973).

The mechanical effect of oil on bird plumage is well known. The damage that can be afflicted through entrainment of petroleum hydrocarbons in the food chain is less obvious and not well known (Murphy 1971). In the final analysis, the freedom from oil in the water will be dependent on just how much the consumer is willing to pay for each added level of safety.

### *Minerals*

Alaska is rich in minerals and presumably their extraction could have impact on seabird food chains, particularly if the mining is done on the coast or near river systems draining directly into the sea. The seabird also shows promise of future development. Because of the great extent of continental shelf adjacent to Alaska there is potential for impact on seabirds from widespread and diverse developments. Seabird deposits of phosphate and nodules of iron, manganese, cobalt, nickel, and copper are known to occur in the global sea. In Alaska, gold has been dredged from the beaches and littoral at Nome. Information on the potential impact of mineral extraction on the living resources of the sea is needed.

### *Fur Farming*

During the first third of this century, foxes, *Alopex lagopus* and *Vulpes fulva*, were introduced on many islands in Alaska. The selection of these islands was dictated by the presence of a regular food supply, usually birds or marine mammals. Seabird nesting populations were seriously depleted on many islands and remain so to this day. Seabird colonies on the south coast of the Alaska Peninsula were delineated and mapped during the summer of 1973. Islands with vacant seabird nesting habitat almost invariably showed some evidence of past fox farming activities. Murie (1959) credits the drastic reduction in numbers of Cassin's auklet, *Ptychoramphus aleuticus*, to this cause. Commercial farming of free-roaming foxes on bird islands is a resource conflict that is neither compatible nor acceptable.

### *Livestock*

Livestock, domestic cattle, sheep, and reindeer, are known to cause depletion of ground-nesting birds when the livestock numbers on a range are too great or their movements uncontrolled. They destroy nests by stepping on them or by removing the cover and exposing the nests and incubating birds to increased

predation. Burrow nesters are often subjected to trampling of their burrows which also causes disturbance and loss. This type of impact could become more significant as grazing of seabird nesting areas becomes more profitable.

#### *Disturbance From Other Activities*

Seabirds nesting on cliffs are highly susceptible to disturbance. The incautious, close approach of aircraft, boats or people on foot almost invariably results in a panic flight of birds from cliffs. During incubation and brooding each occurrence causes a rain of eggs or young to fall from the cliff. Other chicks and eggs that are temporarily abandoned fall prey to gulls and other predators.

### **Management**

#### *Current Status*

Historically, management of Alaska's seabirds has been virtually limited to the acquisition of breeding areas. The Federal Government, through the national wildlife refuge system, has extended the blanket of federal protection to much of the best seabird nesting habitat in Alaska. Twelve refuges have either been acquired for seabirds or extend protection to major seabird concentrations. The State of Alaska recognizes many of these same areas as sanctuaries and provides additional protection through one state game sanctuary. Other outstanding seabird nesting areas are under the jurisdiction of other federal agencies. These include the Pribilof Fur Seal Reservation and the Chugach National Forest.

Recently, surveys designed to assess seasonal seabird populations and distribution have been made in Bristol Bay, Prince William Sound and the Gulf of Alaska. Surveys of nesting colonies have been made in the Aleutian Islands, the Gulf of Alaska, and Prince William Sound. Other surveys have been made from ice breakers operating in the pack ice of the Bering, Beaufort, and Chukchi Seas.

#### *Management in the Immediate Future*

Seabird studies in the Gulf of Alaska, Prince William Sound, Bristol Bay, and the Aleutian Islands will be continued, expanded, and refined. New seabird areas will be acquired through the settlement of native claims. Part of the planning of the native claims settlement effort relates to providing active management of the seabird colonies within existing refuges and new ones which may be acquired. Manipulative management is still some distance away and, even when it comes, may be limited to manipulating external influences. For the near future, work will be directed at data collection and maintenance of nesting populations at their existing levels.

Increased inventory work and all-out efforts to refine inventory methods are certain. The present piecemeal management will be integrated into an organized effort. One rather ambitious effort already started is the development of a catalog of seabird colonies. This will require intensive efforts to delineate and inventory the colonies over the whole Alaska coastal zone.

### *The Requirements of an Expanded Program*

Almost every aspect of the life history and population dynamics of seabirds will have to be investigated. The interrelationships of seabirds with other resources and the exploitation of these resources must be studied and evaluated. Data will be required for environmental impact assessments for oil lease sales, timber sales, fox eradication programs, etc.

The settlement of the native claims will probably result in the removal of lands with major seabird concentrations from federal management control. Therefore, it is essential that the Bureau of Sport Fisheries and Wildlife actively explore cooperative agreements with native corporations for the management of seabirds on native lands. Similar agreements are desirable for management on other private lands and on public lands not dedicated to wildlife.

### *Mechanisms and Responsibilities for Management*

Management within the territorial sea will be a joint state and federal effort but the bulk of the responsibility for the management of seabirds will fall on the Federal Government. Federal law governing management will be based to a large extent on international treaties and agreements. There is already a considerable body of agreements and treaties related to international fisheries which will offer clues on how or how not to proceed with seabird agreements.

The United States is presently party to bilateral agreements with Canada and Mexico. Each of these has strengthened the Federal Government's control over all migratory birds. Alaska, in particular, will benefit from recent extensions of the treaty with Mexico and the pending treaty with Japan. Still needed are similar migratory bird treaties with Australia, New Zealand, Chile, and the Soviet Union. A multinational treaty with all Pacific rim countries with interests in seabirds is desirable. Beyond the limits of the territorial sea we can control the activities of United States nationals only, and the development of national laws related to the management of seabirds can best be achieved through international agreement.

Future development of international agreements on management of seabirds will doubtlessly be colored by pending changes in the law of the sea.

The third United Nations Conference on Law of the Sea will be convened in Caracas, Venezuela this summer. It is being held in an attempt to avert the impending crisis in the use of the oceans and their resources. Without the development of an international consensus, chaos is inevitable. In this century, the existing law of the sea has been increasingly stressed by technological advances not foreseen at the time it was developed. The result has been a general erosion of national agreement as nation after nation has made unilateral claims upon the sea.

The United States is among those nations still claiming and recognizing a 3-mile territorial sea. Recently Pollock (1973) has indicated a United States acceptance of a 12-mile territorial sea. A 12-mile territorial sea would allow each nation to manage the inshore and nearshore species breeding along their coasts. Complete international management of seabirds in international waters is feasible as is management based on range and rearing place.

## Conclusions

Seabirds have been virtually ignored by oceanographers, marine biologists, ornithologists, and resource managers. Rapidly increasing demands are being placed on marine ecosystems through increased exploration of marine resources and pollution.

Resource management, passive for many years, is now showing signs of developing into a more active program. This program development will be hampered by a lack of basic data for some years to come. Basic life history and population dynamics must be studied before inventories can be refined. There is already a gap between requirements for data and the ability to supply it.

New international agreements and an up-to-date law of the sea will be vital to future management, which for many species will have to have an international base.

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## Discussion

DISCUSSION LEADER LOUGHREY: Thank you, Mr. Sowl.

In Canada, we have a problem of seabirds, murrens particularly, caught up in floating

gill nets in the high seas fishery. Do you have any views as to how this can be regulated or any mitigation that can be taken to reduce this?

**MR. SOWL:** I might preface my remarks by saying that the high seas gill-net fishery is a bone of contention for the United States and Japan right now and is sensitive ground. We don't know how it will be resolved.

One way we could reduce the kill of murre and puffins in the United States—in this case, those birds nesting in the Aleutian Islands—is to move the fishery offshore. With each added mile, of course, we reduce the danger. The trouble is that we have to remove the fishery some 150 miles from shore and that is quite a ways.

As for the shearwaters, they are all over the Bering Sea in the summer.

# Progress in Saving Endangered Species

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## Introduction

In 1964 work began in the Bureau of Sport Fisheries and Wildlife on what was to become the first Red Book of native rare and endangered species. First legal authority for a program came in 1966 when Congress passed the Endangered Species Preservation Act. This law was for preservation of only *native* endangered species and provided for the first list of 72 entries which was published in the Federal Register in March 1967.

The Bureau's program for endangered wildlife research began in 1965. Now located at Patuxent Wildlife Research Center, Laurel, Maryland, the program consists of field studies on certain species of endangered birds and the black-footed ferret and research to develop propagation methods for selected species. The Bureau's Wildlife Refuges system has served endangered species as well as nonendangered species down through the years. Special management was provided in some locations such as Aransas National Wildlife Refuge for the whooping crane and Key Deer National Wildlife Refuge in Florida. Development of a habitat acquisition program under authority of the Act has resulted in a growing group of refuges whose special purpose is endangered species management and protection of key habitat.

In 1969 public interest was sufficient to encourage passage of the Endangered Species Conservation Act which authorized, for the first time, listing of foreign endangered species. The Act prohibited importation of listed species into the United States. Exceptions for special purposes could be allowed by permit.

During this period from 1966 to 1970, responsibilities for recommending candidate species for the Endangered Species List of the Secretary of the Interior were in the hands of an ad hoc committee made up largely of Bureau personnel. Coordination of the Bureau program was the responsibility of a one-man office. Bureau expenditures for endangered species were primarily for law enforcement at import stations, research, and wildlife refuges. Habitat was acquired with Land and Water Conservation Funds.

Somewhat concurrent with the surge in interest and concern for environmental quality, public interest in endangered species also blossomed about 1970. Conservation groups gave endangered species a more prominent priority in their concerns. Endangered species became a prominent topic for published articles, both scientific and popular.

In FY 1973, Congress approved for the first time an Endangered Species Program as a line item in the Bureau's budget request. The amount appropriated was \$1,768,000. It did not include that part of the Bureau's appropriation used for law enforcement and refuge operations. This year, FY 1974, the needs of these two divisions have been added to the Endangered Species

Program budget which now totals \$4,660,000. The President's budget for FY 1975, now being considered by Congress, calls for \$5,527,000 for Endangered Species. None of these amounts includes the appropriation for endangered species habitat acquisition under the Land and Water Conservation Fund which come under a separate appropriation administered by the Bureau of Outdoor Recreation.

While the Bureau has had authority for endangered species restoration since 1966, funds to maintain more than a minimum program were not available until FY 1973. Accomplishments within this context are largely confined to starts and the events that relate more to the "means" rather than the "end itself." The end product of a successful endangered species program, in this case, is an endangered species restored to the point where it once again becomes a viable component of its ecosystem and can be delisted as a result. This is our ultimate goal. We must recognize, however, that, for some species, every year we manage to delay approaching extinction holds some cause for rejoicing because it means there is still hope. We believe the Puerto Rican parrot to number no more than 16 individuals in the wild, but recent successes with captive propagation, new knowledge about nesting needs, and identification of other correctable factors make every year important.

Although identifiable Bureau effort in endangered species has been in existence for 10 years, it was not until FY 1973 that funds were available on a program basis. Successes thus far, in terms of restored species, are largely the result of management and actions that started prior to 1964—for example, the trumpeter swan.

It should be recognized that programmed restoration of individual species must be backed up with certain "tools" or means to bring about solutions to problems faced by each species. Where these problems are shared by a number of species in common it is logical to seek common solutions. For example, exploitation or destruction of individual endangered animals or plants and their habitats is a common worldwide problem which lends itself to a common solution.

In this context, we want to report on progress in developing some of these "tools," realizing that satisfactory results come only after successful application of these "tools."

Among the basic "tools" required to carry out an effective program are laws and regulations. We recognize that laws alone will not do everything for most species. However, the total task for most species would be more difficult or impossible without effective legislation.

### **International Convention**

The most significant recent accomplishment for the benefit of world species was the conclusion of the Convention (treaty) on International Trade in Endangered Species of Wild Fauna and Flora.

Drafters of the 1969 Endangered Species Conservation Act recognized the obligation of this country to conserve species of the world. Further, they realized that control of traffic into the United States of endangered species or their products, as provided by the Act, was not enough to assure survival of the world's species. While this country did constitute a significant part of the



world's market for endangered animals, there were other "user" nations making demands on the world's dwindling wildlife supplies. Furthermore, U. S. businesses would be unfairly penalized by a provision that wouldn't be effective with international control. Congress, therefore, built into the 1969 Act a provision for an international meeting to draft a treaty for cooperation among nations in controlling commercial traffic in certain species of animals and plants.

Through the good efforts of many in the Departments of Interior, Commerce, and State and others both inside and outside the Federal Government, and with the help of the International Union for Conservation of Nature and Natural Resources (IUCN) and some of the other nations in establishing a platform for the meeting, representatives of 80 nations gathered in Washington, D. C. on February 12, 1973. In addition, eight other nations sent observers. Nearly all of the important "user" nations and wildlife nations were represented. Both developed and developing nations came—both east and west.

### *Content and Appendices*

Under the skillful chairmanship of the State Department's Christian A. Herter, the conference labored for three weeks drafting the contents of the Convention including three appendices or lists of species to be covered by provisions of the Convention. The Convention established a system of regulations to prevent the commercial overexploitation of any species, subspecies or isolated population of wild plants and animals. Differing levels of trade regulation are provided for each appendix depending, in part, upon the degree to which such forms are threatened with extinction and the contribution trade or international traffic makes to such a threat. The Convention applies to all forms of animal life or readily identifiable parts or derivatives; import, re-export or export; and to plants and animals. Species listed in the appendices are confined to those that are likely to figure in international trade. Provision is made for the periodic amendment of the lists.

Appendix I includes all species threatened with extinction which are or may be affected by trade. Trade in these specimens will be subjected to particularly strict regulation to guard against further jeopardizing their survival. Exceptions will be allowed in only few circumstances. Trade that is allowed will require both an export permit from the country of origin and an import permit from the country of destination. The list presently consists of 375 faunal and 45 floral taxa and includes all species of commercial interest now on the United States list.

Appendix II includes (1) all species which, although not necessarily now threatened with extinction, may become threatened unless trade in specimens of such species is strictly regulated to avoid utilization incompatible with their survival; and (2) other species which must be subject to regulation so that trade in specimens of certain species referred to in (1) above may be brought under effective control. Trade in Appendix II specimens requires the issuance of an export permit. No member nation will allow the import of such specimens unless accompanied by such a permit. The list now includes 239 faunal and 26 floral taxa.

Appendix III is made up of species submitted only by nations in which those species are found. Such species are those for which that nation wishes international cooperation in controlling trade. Nations who place a species on Appendix III will require that specimens be accompanied by an export permit before specimens can be exported. Other nations will agree to require the presentation of such permits before allowing the importation of such specimens. Appendix III lists cannot be submitted before the nation files its articles of ratification.

Trade between member and nonmember nations is permitted if the nonmember provides compatible documentation which substantially conforms with the requirements of the Convention.

### *Status of the Convention*

The conference was concluded on March 2, 1973. Practically all delegations with plenipotentiary powers signed immediately, and by February 11, 1974, 42 nations had signed.

The Convention enters into force 90 days after the tenth nation has deposited its articles of ratification with the depositary government, Switzerland. Any nation may accede at any time.

The Senate gave its advice and consent to the Convention, and it was ratified by the President on September 13, 1973. It was implemented by certain provisions of the Endangered Species Act of 1973 signed on December 28, 1973. On January 14, 1974, the United States became the first nation to deposit its articles of ratification. We are advised through the Department of State that a number of nations are either in or completing the process of ratification. Our best guess is that the Convention will go into effect yet this year. It remains now, for the United States, as every nation, to appoint a Management Authority to issue permits for this country and a Scientific Authority to provide technical advice.

The United Nations Environmental Unit in Nairobi, Kenya, has accepted the role of the Secretariat to carry out the day-to-day operation of the Convention between meetings of the contracting States which will be held at least once every two years. The Secretariat also will receive and distribute reports from the contracting States, coordinate amendment of the Appendices, undertake and perform other services as directed. The Secretariat is authorized to contract with other competent agencies for such services.

### **Endangered Species Act**

Two years' debate has resulted in Congressional action on new endangered species legislation and program authority for the Secretaries of the Interior, Commerce, and Agriculture. The new legislation is known as the Endangered Species Act or Public Law 93-205.

This is a strong measure that will, if adequately funded and fully enforced, result in considerable benefit to many species of plants and animals in trouble. The legislation, in some parts, is complex, and requires interpretation. Space here does not allow a complete analysis, but public interest warrants explanation of the main features in terms of what we expect the result to be.

### *Broader coverage*

Our authority has been broadened by this new legislation to cover essentially all animal and plant life, native or foreign. Prior authority pertained only to vertebrates, mollusks, and crustaceans. The definition of fish and wildlife in the context of the Act now means any member of the animal kingdom [Section 3(5)]<sup>1</sup> with the exception of insects, determined by the Secretary to present an overwhelming and overriding risk to man. Plants are also included in the new legislation. The Smithsonian Institution is charged with preparation of a list of plants that are now or may become endangered or threatened along with methods of conserving them. A report is to be submitted to the Congress by the end of 1974 [Section 12].

Only endangered species were benefitted by the old Act. Under the new Act, steps are taken to prevent species from becoming endangered. Section 4 provides for listing not only endangered species but for threatened species, e. g. ones that may become endangered within the foreseeable future. Although species sometimes popularly called rare have never had official status, this category will be reviewed to determine if any such species should be recognized as threatened under the new Act.

Other than being members of different lists, the distinction between endangered and threatened species is that, for endangered species, protection is legislated [Section 9 (a) (1) (A-F)]—that is, the Act spells out *precisely* what you cannot do, while for threatened species, the Secretary is authorized to issue special regulations for each species so listed [Section 4 (d) and 9(a) (1) (G)]. It is possible for these special regulations to be as restrictive as the protection and exemptions legislated by the Act for endangered species. But the purpose of the measure is to provide more flexibility in the management options available for threatened species. It may be possible in extreme cases, for example, to allow limited fishing for a threatened species, but if the fish is endangered, the Act says simply, “no taking.”

Heretofore, to be included on the endangered species list, an animal had to be recognized by taxonomists as a distinct species or subspecies. The new Act provides for listing not only species and subspecies, but includes separate populations that may not be taxonomically distinct from a larger unendangered or unthreatened population of the same subspecies [Section 3 (3,4, and 15) and Section 4 (c)]. We visualize this feature being used to protect unique or disjunct wild populations and prospective new taxa whose descriptions have not been published yet.

### *Federal Interagency Cooperation*

Borrowing from the split in enforcement jurisdiction first adopted in the Marine Mammal Protection Act of 1972, the Act divides responsibilities for the endangered and threatened species conservation program between the Departments of Commerce and the Interior.

The result gives Commerce authority over whales, seals, and sea lions with other species jurisdiction to be resolved between the two departments. Both agencies cooperate in the listing process.

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<sup>1</sup>All section references are to Public Law 93-205

The old Act was less pervasive as to the requirements placed on other Federal agencies and then referred specifically only to the Interior, Agriculture, and Defense Departments—primarily the Federal land-managing agencies. The Act of 1973 is more explicit.

Section 7 provides:

The Secretary shall review other programs administered by him and utilize such programs in furtherance of the purposes of this Act. All other Federal departments and agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to Section 4 of this Act (those species on the Federal list) and by taking such action necessary to insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of such endangered species or threatened species or result in the destruction or modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with the affected States, to be critical.

#### *Federal-State Authority*

Where the old Act provided no federal legal protection whatsoever for native species, the new Act provides for a very large federal role [Section 6 (f) and (g) and Section 9]. The taking of *any* endangered or threatened species will be a violation of federal law, regardless of whether that animal is migratory or resident to a state. Heretofore, regulation of the protection of most *resident* species of fish and wildlife had been left to the states. Federal authority for any endangered animal, heretofore, has been governed solely by the Lacey Act for those wildlife which also happened to be protected by State law, the Migratory Bird Treaty Act for most birds, the Marine Mammal Protection Act of 1972 for designated species of mammals, and the Bald Eagle Protection Act for the Southern bald eagle.

Elsewhere Section 9 describes other prohibited acts. These prohibited acts include: (1) importing or exporting an endangered species, (2) taking such species within the United States and also in our territorial waters and anywhere on the high seas by a United States subject; and (3) the possessing, selling, and even transporting of any species taken in violation of Section 9. In Section 3 (14) we find that the definition of "take," which is prohibited by Section 9, includes to harass or harm or pursue, or to attempt to do so, as well as to kill or capture. Therefore, any action that has to do with an endangered animal and some actions that have to do with threatened species may be regulated. Even research on one of these animals, or any other activity, which may "harass," will require a permit.

#### *Federal-State Cooperation*

There is no question that the most desirable and effective way to accomplish the purposes of the Act and the program is close cooperation between the Federal and State Governments in carrying out programs in the best interest of the species concerned. The Act goes to great length to specify how cooperation will take place. Section 6 (a) says that the Secretary shall cooperate to the

maximum extent practicable with the states, including consultation prior to federal acquisition of lands or waters for endangered species habitat. Before listing any resident species as endangered or threatened, Section 4 (b) provides the Secretary is to notify each State Governor at least 90 days before such action is made final [Section 4 (b) (B)].

The Secretary may enter into an agreement with the state for management of a piece of endangered or threatened species habitat owned by the Federal Government.

Finally, the Act provides for a Cooperative Agreement between the Secretary and the State that becomes the basis for (1) assumption of sole authority by the state to control the taking of resident species of endangered and threatened species subject to Federal guidelines and (2) for eligibility of the state for federal grants-in-aid for endangered and threatened species management. Among other things, the agreement must show that the state has authority to conserve resident species which are on the federal lists and that the state game and fish agency has established acceptable conservation programs for such listed species and has authority to acquire habitat and can conduct investigations into the status and requirements for survival of *all* species of resident animals [Section 6 (c)]. Of course, no Cooperative Agreement will be acceptable to the Secretary which does not provide protection which is equal to or greater than that which the Federal Act would otherwise provide. Therefore, one way or the other, the new Act of 1973 will provide for more protection for endangered or threatened species than before. The states will have 120 days following the close of the first regular session of the state legislature which convened after December 28, 1973, or until March 28, 1975, whichever is sooner [Section 6 (g)], to submit their proposed Cooperative Agreements. Otherwise, authority for regulating the taking of resident endangered or threatened species in that State will also be assumed by the Federal Government. Although both jurisdictions could then regulate the taking of endangered species, the states could not be less restrictive [Section 6 (f)]. If the state fails to meet its deadline, it may reclaim sole authority upon adoption of an acceptable Cooperative Agreement with the Secretary.

#### *State Grants-in-Aid*

Any state that has entered into a Cooperation Agreement with the Secretary can be considered for an allocation of federal funds appropriated for conservation of endangered or threatened species. Which states receive funds and how much will be based primarily on: (1) the number of endangered and threatened species within a state, (2) the relative urgency for action on those species, (3) on the potential for restoration of such species, and (4) the degree to which a State is prepared to proceed with a conservation program consistent with the Act [Section 6 (d)]. The federal share of such a grant-in-aid program will be two-thirds of the total cost, but if two or more states cooperate on a common project, the federal share can be three-fourths.

The Act authorizes to be appropriated through FY 1977 up to \$10 million for the Endangered Species grant-in-aid-program. Since the regular budget request for FY 1975 is already before Congress, any grant-in-aid program for FY 1975 would have to come through a FY 1975 supplemental request.

We want to reiterate that laws alone do not make a program. Cooperation among states and nations is an essential component of a successful formula. The Convention and Act provides for that cooperation. There should be compatible legislation in every state to accomplish at that level what the Act and Convention do at the national and international levels.

In cooperation with the International Association of Game Fish and Conservation Commissioners, a model State bill has been developed. As a result, we hope to soon see laws and lists for endangered and threatened species in each State.

All in all, we are looking forward to working together with all governments and all groups so we may soon be reporting "species saved" each year.

## Discussion

MR. STEPHEN CAMPBELL [Denver, Colorado]: I would like to know what the Federal Government is doing to secure information as to how many porpoises and dolphins are drowning because of foreign fishing fleets, and also how industry and government are encouraging U. S. fishermen to use the Medina net and the backdown method in fishing.

MR. RUHR: This matter comes under the jurisdiction of the National Marine Fisheries Service.

MR. CAMPBELL: I realize that but thought you would be aware of the problem.

MR. RUHR: I am aware of the problem, but not of the solution.

MR. EARL BAYSINGER [Bureau of Sport Fisheries and Wildlife]: I have been working with the Department of Commerce on the endangered species program which now is split between the two agencies. A great deal of research has been done on this. The National Marine Fisheries Service is encouraging the fishing interests to adopt these techniques. The reports we hear are satisfactory. The problem is: How does one enforce a good idea like this when the person using the technique is some thousand miles offshore? It's going to take more questions like this and forums like this to get going.

MR. CAMPBELL: Are you just getting encouragement from the U. S. fishermen or from foreign fleets also?

MR. BAYSINGER: This would be strictly on the U. S. side. There is nothing we can do that would force the fishermen of a foreign country to comply.

MR. CAMPBELL: So, in reality, porpoises and dolphins could really be threatened and endangered. Is that right?

MR. BAYSINGER: The potential would be there.

MR. CAMPBELL: But there is no information as to how many are drowning from activities of foreign fleets?

MR. BAYSINGER: No.

MR. CAMPBELL: Will anything be done in the future as to what these fleets are doing to these animals?

MR. BAYSINGER: I would like to think so. This, again, goes into an area that is the responsibility of an agency that is not ours. The NOAA will be working through their fishing agreements. As you know, they have various treaties with other nations, regulating the manner and the techniques to be used on the fishing grounds. So I am speaking a bit outside my area of knowledge—which isn't unusual, but I will quit at this point.

DISCUSSION LEADER LOUGHREY: Thank you. That helps. I think that it is beyond my field of competence, too, but it is possible that this whole subject will be discussed at the Law of the Sea Conference which is upcoming.

MR. JERRY PRATT [Past President, Hawaii Chapter, Wildlife Society; Arizona]: I am greatly concerned about Hawaii. Since they have the largest number of endangered birds of any state, that puts them on the top of the priority list under the new Endangered Species Act. Personally, I do not feel that they have the desire or the capability to preserve their endangered wildlife, and I wonder if the new law has the measures in it that will prevent Hawaii from collecting federal aid if they aren't using it for endangered wildlife.

I base this on the fact that Hawaii collects great sums of federal aid for wildlife restoration and they use that money for purposes far from wildlife restoration. They even spend it on airport lands, believe it or not. I just hope that this law does not allow them to collect a lot of federal aid and then spend it for uses that have nothing to do with endangered wildlife.

MR. RUHR: Jerry, I recognize your concern. The grant-in-aid under the endangered species program will provide for close control over what the money is used for, because we will need to identify the species for which the project is written.

Further, I didn't want to leave the impression that we wouldn't be trying to do anything in terms of investigations and species management. We will be working with the state with federal appropriations other than grants-in-aid at the same time.

# Trumpeter Swan Management in the National Wildlife Refuge System

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In writing the life history of the trumpeter swan (*Olor buccinator*) in 1925, Bent described the status of the species thus: "This magnificent bird, the largest of all North American wildfowl, belongs to a vanishing race." At that time only a few trumpeters remained in Wyoming and Montana and they were declining in numbers. Although some were known to exist in Canada and Alaska, almost nothing was known about them.

Fortunately, Bent's prophecy was premature. The trumpeter swan represents one of the first species of wildlife brought back from the brink of extinction through a concentrated management effort. The fruit of these efforts was realized in 1968 when the Department of Interior was able to remove the trumpeter swan from its list of rare and endangered wildlife.

The preservation of the trumpeter swan was accomplished in large part through a successful program of protection and transplanting in the National Wildlife Refuge System. In this paper I will summarize the techniques used to restore and maintain trumpeter swan flocks and will discuss current objectives for the species in relation to its present status.

## **Preservation and Expansion**

Active management of trumpeter swans began with the establishment in 1935 of Red Rock Lakes National Wildlife Refuge in the Centennial Valley of southwestern Montana. The refuge was given the mission of protecting the last known flock of trumpeters in the United States. A census in 1936 of swans at Red Rock Lakes and in the surrounding tri-state area of Montana, Idaho, and Wyoming, including Yellowstone National Park, revealed a population of just 117 trumpeters (Banko 1960). Under the increased protection provided by the refuge and with the aid of a supplemental winter feeding program, the flock entered a period of rapid growth that lasted until the mid-1950's when a population of about 600 was reached. The available habitat within the tri-state area was by then saturated with swans and the growth of the flock ceased.

As early as 1938 it was decided that the trumpeter swan should be restored to additional portions of its historical breeding range by transplanting swans to other refuges. The National Elk Refuge in Wyoming was the first site to be selected with four cygnets transferred from Red Rock Lakes in 1938. Malheur Refuge in southeastern Oregon was included in the transplant program the following year. Ruby Lake Refuge in northeastern Nevada received its first group of swans in 1947 when 12 which had originally been transferred to Malheur were retransferred to Ruby Lake. In later years Ruby Lake received swans directly from Red Rock Lakes. Lacreek Refuge in southwestern South



**Table 1. Data for national wildlife refuges receiving trumpeter swan introductions from Red Rock Lakes National Wildlife Refuge.**

Refuge	Year of Introduction		Total Swans Introduced		Year of First Nesting
	First	Last	Adults	Cygnets	
National Elk	1938	1941		10	1944
Malheur	1939	1961	25	102 <sup>1</sup>	1958
Ruby Lake	1947	1957	25	71 <sup>1</sup>	1953
Lacreek	1960	1962		57	1963
Turnbull	1963	1966		37	1967

<sup>1</sup>Twelve cygnets originally transferred to Malheur were moved to Ruby Lake in 1947. They are listed under Ruby Lake NWR.

Dakota entered the expansion plan in 1960 and Turnbull Refuge in eastern Washington was selected as a reintroduction site in 1963. From 1938 through 1966, 327 trumpeter swans, 50 adults and 277 cygnets, were transferred from Red Rock Lakes to other refuges for the purpose of establishing new breeding flocks. No additional refuges have been included in the expansion program since the introduction was completed at Turnbull in 1966. More detailed data on the refuge introductions can be found in Table 1.

#### *Establishment of Breeding Flocks*

All of the refuges selected for introductions were eventually successful in establishing a breeding population of wild, free-flying trumpeter swans, but the amount of effort required and methods used to achieve this success varied markedly. At National Elk Refuge two of the four cygnets released in 1938 paired and nested successfully for the first time in 1944. The birds were not wing-clipped or held in pens. One or two nests a year have been found nearly every year since then at the National Elk Refuge.

At Malheur Refuge it took 19 years to establish trumpeters as a breeding bird. Early attempts with pinioned birds and free-flying cygnets and family groups were unsuccessful. The free-flyers disappeared soon after release and the pinioned birds made only two rather listless attempts at nesting. In 1955 the refuge switched to the release of wing-clipped birds into an enclosed pond. This method allows the wing-clipped birds to become acclimated to the area before they become free-flyers and provides a decoy flock for those birds that were either released as free-flyers or had completed the moult. This approach resulted in the first successful nesting in 1958 (McLaury 1973).

One nest was reported for Ruby Lake Refuge in 1953 but swans did not nest there again until 1958. Since that time they have been successful breeders nearly every year. Early attempts at Ruby Lake involved pinioned birds, including those which had been retransferred from Malheur, but success was eventually achieved with wing-clipped birds held in pens over the first winter. This method was also employed at Lacreek Refuge and successful nesting occurred just three years after the first introduction.

At Turnbull Refuge the transplant began in 1963 with six hand-reared cygnets from Red Rock Lakes that were pinioned to serve as decoy and display birds. Later transplants in 1965 and 1966 were wing-clipped and held until 1967. The first successful nest at Turnbull was established in 1967 by a pair of the pinioned birds in the display pen. Free-flying trumpeters first nested at Turnbull in 1969.

Trumpeter swans have pioneered on their own to establish the species as a breeding bird at two additional national wildlife refuges. They reached Valentine Refuge, in north central Nebraska, in 1967 and successfully nested for the first time in 1970. These birds are part of the Lacreek flock and return to Lacreek to winter, approximately 75 miles to the northwest. In 1968 trumpeters reached Grays Lake Refuge in eastern Idaho and successful nesting occurred in 1970. Grays Lake is about 50 miles southwest of the National Elk Refuge. Trumpeter swans are also nesting at Kenai National Wildlife Refuge in Alaska, giving a total of nine national wildlife refuges in nine states where they are established as breeding birds.

#### *Maintenance of Established Flocks*

Management practices to maintain the established breeding flocks include such activities as protection, reduction of all disturbance in the nesting and wintering areas, encouragement of muskrat populations for nesting sites, encouragement of aquatic vegetation favored by trumpeters for food and cover, publicity programs to reduce losses by indiscriminate shooting, and monitoring of populations to identify areas in need of protection or improvement.

Five refuges; Red Rock Lakes, Turnbull, Lacreek, Ruby Lake, and Malheur; are presently conducting winter feeding programs but only three of the programs are conducted on a large scale. The program at Malheur has been reduced to a limited basis in the last few winters and will be eliminated completely in the next year or two. The Ruby Lake program is limited to two or three days feeding each winter during particularly bad weather. The National Elk Refuge discontinued winter feeding in 1972 because the trumpeter swan was no longer considered an endangered species. No ill effects have been noted as a result of this change.

Those refuges that have water management capabilities manipulate pool levels to favor swan nesting. Water management can also be used to make open water available in the winter by increasing flows in very cold weather. One refuge uses an aerator to keep a small open water area during severe weather.

Other activities include elimination of overhead wires, a serious cause of trumpeter swan mortality; coordination with landowners near refuges who have trumpeter swans nesting or wintering on their property; and promotion of research activities designed to improve present management techniques.

### **Trumpeter Swan Objectives In the Refuge System**

In 1971 the U.S. Bureau of Sport Fisheries and Wildlife implemented a systems approach to the management of national wildlife refuges. The purpose

of the system was to establish a set of individual refuge objectives for all programs and activities on a refuge, based on the capability and demand of the refuge to produce those programs and activities. A unit of measure, known as the Refuge Benefit Unit was assigned to each output that a refuge could produce. When two or more objectives conflicted, the refuge would plan to produce the outputs of those objectives in such a manner that the total number of Refuge Benefit Units generated would be maximized. Thus, an objective to produce and maintain trumpeter swans is based not only on a refuge's ability to meet that objective, but also on how efficient it is in relation to the refuge's other objectives. To give a brief guide to the relative value assigned to the various outputs, one mallard use day was assigned one RBU; one peregrine falcon use day, an endangered species, 500 RBUs; each acre of land preserved by a refuge, 20 RBUs; and each activity hour of birdwatching, 50 RBUs.

Trumpeter swans, along with a few other species, were placed in a special group called "nationally unique species." It was felt that these species, because of their scarcity, spectacular characteristics, place in history, or for other reasons, commanded special national recognition and therefore rated a relatively higher measure of value. Accordingly, each use day of a species in this category was assigned a value of 50 RBUs. When the system was revised in 1972, however, the "national unique species" category was dropped. Since the trumpeter had previously been dropped from the rare and endangered list, it then fit into the same category as other waterfowl, receiving one RBU per use day. The current value assigned to the trumpeter swan reflects the relative security that has been achieved for the population and has resulted in a de-emphasis of intensive management for the species.

Each refuge used this procedure to establish its objective for the maintenance and production of trumpeter swans. The total objectives for the nine refuges that now have breeding populations are to maintain 248,000 use days and to produce 260 cygnets annually from a total population of 980 swans. When the trumpeter was removed from the rare and endangered list in 1968, the total population for these refuges was 670 swans. The flock at Lacreek Refuge has been the only one to show any significant increase in population from 1968 to the present, having increased from 76 to 138 trumpeters in that period.

## **Discussion**

In announcing the removal of the trumpeter swan from the rare and endangered list of wildlife in December, 1968, the Director of the Bureau of Sport Fisheries and Wildlife stated "We will continue to monitor swan populations, and we intend to increase our efforts to restore trumpeters in appropriate parts of their former breeding range" (Gottschalk 1968). This position is evidenced in the Bureau's 1974 migratory bird program advice where the evaluation of the suitability of establishing new nesting populations of trumpeter swans is included as one of 48 items in the operating plan. However, implementation of a new transplant program is influenced by the present status of the trumpeter swan. Since the species is no longer considered endangered or threatened, further expansion must be justified for reasons other than population security. In addition, the trumpeter swan is not a hunted

species of waterfowl, and probably never will be, thereby limiting the need for a large, widely dispersed population. Thus the establishment of additional breeding flocks of trumpeter swans is currently receiving a low priority in relation to the many other wildlife management needs facing the Bureau.

The present total population of trumpeter swans in the world is still thought to be under 5,000 with less than 1,000 in the 48 contiguous states. Is this a sufficient number and is their present distribution broad enough to satisfy the demands of the public? Will the present breeding areas of the trumpeter swan remain secure in view of the continuing degradation of habitat surrounding our National Wildlife Refuges? The Bureau must continually evaluate the status of the trumpeter swan population to assure that future goals and priorities are established in line with the needs of the species and the demands of the public.

The Bureau recognizes the merit of maintaining a low key program to establish nesting trumpeters in areas clearly suitable to their needs. Several proposals are now being evaluated to determine their suitability for such a program. If priorities and funding change sufficiently to allow this program to become a reality, the Bureau of Sport Fisheries and Wildlife will once again be in the business of establishing flocks of trumpeter swans in additional portions of their historical breeding range so that more may enjoy their beauty and majesty.

## **Summary**

Trumpeter swan management on national wildlife refuges began with the establishment of Red Rock Lakes National Wildlife Refuge in Montana in 1935 to protect the remnant swans of the Centennial Valley. As early as 1938 it was decided that the trumpeter swan should be restored to additional portions of its historical breeding range by transplanting swans to other refuges. To date, the transplant program has resulted in the establishment of trumpeter swans as breeding birds on five national wildlife refuges; Turnbull in Washington, Malheur in Oregon, Ruby Lake in Nevada, National Elk in Wyoming, and Lacreek in South Dakota. The most successful method of establishing new flocks was to transplant cygnets, wing-clip them, and hold them in a pen the first winter while they became acclimated to the area.

In addition to the refuges where trumpeters were intentionally introduced, two refuges, Valentine in Nebraska and Grays Lake in Idaho, have breeding swans as a result of pioneering from nearby flocks. Trumpeters are also nesting at Kenai NWR in Alaska, giving a total of nine national wildlife refuges in nine states where they are established as breeding birds. The successful expansion of the species in its historical range and the discovery of about 3,000 trumpeters in Alaska led to its removal from the list of rare and endangered wildlife in 1968.

Management to maintain refuge flocks of trumpeter swans includes protection, habitat improvement, reduction of disturbance, supplemental winter feeding, public awareness programs, water level manipulations, and population monitoring.

The systems approach to refuge management originally placed special emphasis on trumpeter swan management but when the system was revised in

1972 this emphasis was removed to reflect the current status of the species. Based on the systems approach the objectives for the nine refuges having breeding trumpeter swans are to maintain a total population of 980 swans and to produce 260 cygnets annually.

The United States Bureau of Sport Fisheries and Wildlife has supported continued restoration of trumpeter swans in appropriate portions of their historical breeding range but no transplants to wildlife refuges have been made since 1966. Implementation of a new transplant program is influenced by the present status of the species in relation to the many other wildlife management needs facing the Bureau. Thus the establishment of additional breeding flocks is currently receiving a low priority.

The Bureau must continually evaluate the status of the trumpeter swan to assure that future goals are established in line with the needs of the species and the demands of the public. There is merit in maintaining a low key program to establish nesting trumpeters in additional portions of their historical breeding range. If implemented, this program will once again place the Bureau in the business of expanding the range of the trumpeter swan.

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### **Discussion**

DISCUSSION LEADER LOUGHREY: Thank you, Mr. Fjetland. It is encouraging to end on a positive note of a species that has made a comeback.

MR. JOHN SMITH [Texas Department of Parks and Wildlife]: Could you give us the status of the other swans in North America? Have you worked with those at all?

MR. FJETLAND: I couldn't give you more than a general observation. I haven't been working in depth with whistling or mute swans.

MR. MIKE SAYERS [Ohio Department of Natural Resources]: Are any states other than Ohio working with trumpeters?

MR. FJETLAND: To my knowledge, Ohio is not working with trumpeters at this time. There are proposals to establish additional breeding flocks in some of the more eastern states. These proposals are now being evaluated. There are many problems associated with getting into a further expansion program. Nothing will be initiated within the next year or two, I am sure.



## TECHNICAL SESSION

Tuesday Morning—April 2

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### **Social and Economic Dimensions in Natural Resources Management**

*Chairman:*

ROBERT C. LUCAS

Researcher, U. S. Forest Service, Missoula, Montana

*Discussion Leader:*

B. L. DRIVER

Researcher, Rocky Mountain Forest and Range

Experiment Station, Fort Collins, Colorado

## Remarks of the Chairman

Robert C. Lucas

The statement was made at the opening of the General Session by Dr. Poole, that wildlife does not exist in isolation and that our perspective should be broadened to include not only the more traditional biological approaches to wildlife management problems but also include the social and economic dimensions. Therefore, this Session is recognition of that growing importance.

This is, in a sense, a followup or successor to a session that was organized at the 38th North American Wildlife Conference. That session produced so much interest and so many papers were submitted that a special workshop was held.

Some of you might be interested in a book which is a compilation of all the papers dealing with the social and economic dimensions at last year's session. This is available for two dollars and ninety-five cents. I am sure that John Hende and Dale Potter would be delighted to give you information on how you can obtain one.

This Technical Session has been organized around a broad general theme. We had approximately 50 papers submitted in response to our invitation.

Our central theme could be described as "Values of Wildlife and the Uses of Wildlife." We have four variations on that theme which we have organized into a panel format. It is not much more than clusters of related papers.

The four themes are "Historical and Cultural Perspectives on Wildlife," "Changing Attitudes Toward Hunting," "Landowner Attitudes Toward Use of Lands for Recreation," and "Assessing Values of Wildlife Benefits." There are a number of common threads throughout these groups of papers and both my Discussion Leader and I have been impressed with the degree to which the papers tend to complement and reinforce one another. I think that some of these points of common emphasis and similar conclusions will provoke some interesting discussion.





# A Cross Cultural Comparison of Attitudes Toward Wildlife

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### Introduction

The attitudes and relationships developed toward wildlife in the past still persist in the widely diverse cultures of today. Although many languages have no direct translation for the word "wildlife," virtually all languages have words which refer to wild animals. The German language, for example, has the words *grosswild*, *kleinwild* and *raubwild* to distinguish specific types of animals. Other languages have more generic terms similar to the English term "fauna." For example, the Finnish word *elaimisto* refers to all animal life. But despite the difficulties of finding comparable terminology for the term "wildlife" there exists today a remarkable awareness of the aesthetic value of wild creatures. This paper is based in part upon 100 questionnaires on the evolution of attitudes toward wildlife sent to past participants of the International Seminar on Administration of National Parks and Equivalent Reserves. The respondents were leading park, forest and wildlife preserve administrators representing Africa, Asia, Europe, South and North America. Although the specific emphasis of each country varies as to the importance attached to wild animals and birds as a food source, sport trophy, threat to crops or domestic animals, the trend over the past 100 years is toward increasing importance as an environmental amenity.

### Relationships Which Influence Attitudes Toward Wild Animals

Human behavior and attitudes reflect the relationships which man has with other men and with the world about him. Primitive man's interactions with wild animals had profound influence upon the attitudes he held toward them. Many of his encounters with animals were unavoidable. Others were carefully calculated. Early man both sought and avoided animals. Five sets of relationships are set forth which influence man's attitudes toward wildlife. These five relationships result from man's anticipation of rewards or his hopes of avoiding trouble. These are motives which are directed toward either maintaining or improving his state of being. The anticipation of a particular consequence provides incentive to action (Atkinson 1966). The success or failure of a particular course of action is translated into personal prestige or disdain and eventually accounts for the pattern of sentiments man holds towards animals.

### *Man's Fear of Dangerous Animals*

Primitive man has his evolutionary roots on the same terrain as his most feared animal competitors. Repeatedly man fell victim to a predatory beast. The ferocity of the jungle lingers today in the language of the ghetto. It is imaged by the sudden, unprovoked attack and the traumatic realization that one is face to face with death. Man is the victim. Man is the prey. Kalkari bushman believed the eclipses of the moon were caused by lions so that they could more easily steal into the bushman's hut. Whenever an animal calls, someone would surely answer, except for a lion. It is better to let a lion have the last word.

Fear of dangerous animals leads to the incentive to conquer. Those individuals who were brave and skillful enough to kill an animal which was terrorizing a community won great praise. The successful hunter was made a hero. His actions confirmed his manhood. Virtually every culture has legends which relate the brave deeds of those who conquered the evil beast. The greatest fame came to those who captured or killed the male carnivores. It became the symbol of a chief and the sport of a king.

### *Man's Competition With Animals For Food and Habitat*

Man also shares his territory with lesser animals. The herbivores ravage crops and compete for pasture and browse with domestic livestock. They break fences, trample gardens, destroy orchards, steal grain and constantly harass. From earliest times man has had to guard his territory against the raids of animals. Early cultures devised ingenious ways to ward off the intruding troublemakers. Many animals such as the hare were regarded as particularly cunning. Rabbits seemed to have a way of reappearing. Oriental cultures equated the hare with longevity. Virtually every animal which steals poultry or domestic stock is regarded as clever and cunning. The fox, the wolf, coyote, and hyena all appear in legends as shrewd varmints with intelligence rivaling that of man. Navajos regarded the coyote as a symbol of force with slyness and knavery (Reichard 1928).

A person who successfully guarded his crops from wild animals or destroyed the irksome varmints was highly regarded. Although such a man would not achieve the high acclaim afforded one who killed a tiger, he would gain esteem.

### *Man's Harvest of Animals For Utilitarian Products*

Primitive man seldom ate carnivores, probably due to the flavor of the meat and the superstitions which surrounded each carnivorous animal. Instead man concentrated upon the middle herbivores as a source of meat. However, man found great prestige in wearing or displaying the skins or pelts of ferocious animals. Virtually all nomadic tribes followed animal migrations. The successful hunter was the mainstay of the clan. Great care was taken to insure that each step in the preparation for a hunt was done according to a prescribed procedure.

For example the Navajo believed that if a hunter observed all the rituals, the game allowed itself to be killed. No game would want to be killed by a man who was careless (Hill 1936).

The dependency of primitive peoples on wild animals led to a recognition that the source of supply must be maintained. There has always been economic logic in not eliminating the animals entirely. Females and young were recognized as vital to the vigor of the herd. The perpetuation of the species was vital. There came to exist almost a symbiotic relationship between man and the herd, very close to the concept of animal husbandry. The primary incentive was to guarantee a steady flow of food, hides, antlers, horns, etc. Those who attained the skill and wisdom to accomplish this were honored members of the tribe.

#### *Man's Observance of Animal Behavior As A Model To Explain And Guide His Own*

The close relationships with animals which developed through hunting, defending one's crops and stalking a dangerous beast led to awe and respect for animals. For example, American Indians felt that by observing the conditions of a hunt, they themselves underwent change. When one hunted wolf, they thought, one actually came to possess many of the attributes of the wolf. The Lapps of Finland, Norway and Sweden believed that the first person who came upon a bear in the spring and killed it was worthy to be their leader. Chinese believe that the only animal who knows when it is going to rain is the tortoise. Primitive cultures tend to personify animals in ways which provide lessons for their children. Navajos say "never kill a chipmunk." The chipmunk is a friend of the Navajo people and often shows travelers where to find food and water. (Newcomb 1940).

Man's observance of animal behavior leads to incorporation of it into folktales, religious ceremony and philosophical writings. Although the christianized world tends to ridicule these beliefs as superstition, many of the ancient ideas still persist among native tribesmen on every continent.

#### *Man's Quest for Fulfillment of Psychic Need Through Personal Relationships With Animals*

Primitive man also developed very special personal relationships with some animals. The animal served the role of a friend or protector. Frequently intimate personal emotions were conveyed to a friendly animal. For example, in India the concept of grateful animals assisting their benefactors runs through a whole range of folklore. Navajos regard game as humans, only holier. In Thailand, the white elephant is the symbol of good fortune and if kindly treated will shower blessings to his owner. The white elephant is highly regarded in most Oriental countries for many believe that Buddha is reincarnated and resides within. There exist taboos against killing many animals because of their spiritual significance.

The quest for fulfillment of psychic need leads to special compassion for animals. People who have developed these special relationships tend to possess concern and sensitivity for all wild creatures. They become, especially in oriental cultures, an essential part of one's life.

### **The Influence of Eastern and Western Philosophies**

The way in which man has viewed his relationship with the world about him has been a primary detriment in shaping his attitude toward wildlife.

Sociologist Clyde Kluckhohn says that the principal claim which can be made for culture is that it help us toward predicting human behavior (Kluckhohn 1965). The philosophies of eastern cultures and primitive societies appear to be similar in respect to relationships between man and nature. Western cultures and industrial societies offer clear contrast to the eastern and primitive philosophies. Each of these provides a framework for guiding behavior and attitudes.

### *Eastern Cultures and Primitive Societies*

Both eastern cultures and primitive societies tend to view man as a whole. Eastern philosophy can be abstracted to "existing under a moral order that binds man, nature, and the gods in one" (Redfield 1953). Man exists as part of nature in harmony with nature. Man shares the world's environment with all other living creatures. Emphasis is placed upon wild animals as worthy adversaries. They are harvested only as need dictates. There is an acute awareness of the consequences of disrupting the natural system. For example, the teaching of Buddha "enjoin a reverent and nonviolent attitude not only to all sentient beings but also, with great emphasis to trees" (Johnson and Hardesty 1971). Chiang Yee in his book *A Chinese Childhood* says "cultivate the habit of taking care of your things and of remembering how much trouble went to the growing or making of them" (Yee 1940). The goal of oriental cultures has been to effect a peaceful adjustment to the universe. They regarded animals as peers of man, and although there was no prohibition against utilitarian use of animals, there was the ever present awareness that the world operates according to laws of the universe and animals and man both had their place.

### *Western Cultures and Industrial Societies*

Judeo-Christian philosophy regards the world as a gift from God to man (Nash 1968). The entire universe exists for man. Man dominates and exploits other living creatures because they exist for him. Christian thought conceptualized wilderness as the locale of the devil. The primitive forests were populated with bear, wolves and wildcats and implied fear and dark mystery. It was uninhabitable and seething with terrible animals synonymous with dangers unknown. In contrast to the eastern religions such as Jainism, Buddhism, Taoism and Shinto where a benign and infinite force presided over the Universe, the basic intent of Christianity was to subdue. The emphasis was to convert wilderness to agriculture, to eliminate the competitors and to rid the earth of those beasts dangerous to man. The emphasis was upon the challenge of the hunt and the prestige of the trophy. The most efficient way to remove pests and varmints was regarded as the most logical way. There was wholesale exploitation of animal products. Fads flourished around the prestige of animal furs. Rare and exotic species brought forth the most handsome returns. These same animals, if they escaped the trap, frequently became the experiment for the science laboratory. Only the most educated and sensitive objected. The masses of people in industrial societies were content to enjoy what God had provided. Only after the mass slaughter of animals during our frontier movement west did Americans become concerned about conservation and preservation of wildlife. Even then the majority of people retained the view that

hunting was a legitimate pleasure. The trophy still brings considerable prestige. The use of pesticides to rid agriculture of the threat of uncontrolled animal populations has only recently been curtailed.

The attitude persists that the needs of man take precedence over those of wild animals.

### *Changing Attitudes Reflect Those Which Characterize Eastern Cultures*

The attitudes and relationships developed toward wildlife in the past still persist but the emphasis is shifting to reflect more of the attitudes characteristic of eastern philosophies. There is a worldwide awareness of ecological systems and the consequences of man's impact upon them. For example, Iran, which had lost most of its wildlife heritage, has now established 56 preserves and enacted comprehensive game laws. There is keen recognition of the heritage value of wildlife and concern for threatened species. Adolfo Morales de Macedo of Portugal comments that his country is at present in an interim situation between the customs of old, with an emphasis on kill, and the new ideas of protection. In Italy Professor Screm reports that, while there is a big interest in hunting, the ecological problems implicating conservation are becoming more and more popular. Switzerland reports that all hunting will probably be stopped soon. It is apparent that while wildlife will continue to be sought for trophy and food and resisted in agricultural regions, the trend is toward nonconsumptive use. Urban citizens appear to seek the psychic gratification of observing wild animals. Returns from the *Survey of Evolution of Attitudes Toward Wildlife* indicate wildlife is more important now as a way of understanding the interrelationship of nature and as a way of enjoying leisure through observing animals and birds.

While returns from the survey provide a confirmation that the exploitation of animals still exists in some parts of the world, the trend is toward nonconsumptive use. And while people still are motivated to kill a trophy for prestige and challenge, to protect their land and crops, or to provide, the trend is toward passive enjoyment. There is a gradual shift from the influence of western philosophy toward the philosophy of eastern cultures. We feel this trend is irreversible.

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## Discussion

MR. DAVE ERICKSON [Illinois Department of Conservation]: Mr. Tocher, you suggested that there is a shift from a consumptive attitude to an aesthetic value. Do your data support that conclusion?

MR. TOCHER: We administered the questionnaire to approximately 200 people around the world and in all continents. We got back roughly half. These are people who are the directors of wildlife preserves and the directors of the national parks in their countries.

We asked them specifically to give their best judgement as to the trends in attitudes of citizens in their regions towards wildlife. Virtually without exception, in every country, the conclusion was that the direction is toward a much stronger sensitivity and relationship of individuals to wildlife. This came out of the developing countries as well as industrial countries. The strongest feelings, however, came from those countries in which the population can be characterized essentially as urban-metropolitan. For instance, in Switzerland, the director of one of the parks said he felt that the problems associated with hunting in the Swiss parks would ultimately lead to a ban of hunting in Switzerland. In talking with some of the other people from Switzerland, we found there are things going counter to this but there are movements toward banning hunting or toward emphasizing nonconsumptive use of wildlife that appear throughout virtually every continent.

Almost everywhere we look, there seems to be a pattern of education, a pattern of awareness of man in the system and many of these things. It very strongly reflects itself throughout the world. I think all of them are valid.

# Meanings of Wildlife for Americans: Contemporary Attitudes and Social Trends

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An important function of natural resource planning is to adapt management policies to changes in both resource and resource demand factors. The various social processes that determine the demand for different uses of a resource are subject to constant change. If wildlife managers are to serve the best interests of the public, they must attempt to understand how wildlife attitudes evolve, and respond appropriately. To understand how and why policies should be changed, we must look beyond the resource itself and give more attention to the human factors which determine the demand for different types of use and management policies.

## **Contemporary Developments in Attitudes Toward Wildlife**

In recent years, there have been two important developments in American attitudes toward wildlife. One involves the increasing concern for nonconsumptive wildlife values. The other is the growing criticism of traditional consumptive wildlife uses. Both of these developments have important implications for wildlife policy formulation.

### *Nonconsumptive Wildlife Values*

There are two principal ways in which wildlife are valued which do not entail harvesting or consuming any of the resource. The aesthetic values of wildlife are the pleasures or satisfactions derived from viewing, hearing, photographing, or studying wild animals. The existence or option values (Tombaugh 1971) refer to the benefits derived from simply knowing that wildlife exist; that the option to view or harvest them will be preserved for the future, or that they play an essential role in the ecosystem. These are intangible values that are extremely difficult to quantify but there are undeniable indications that their importance to our culture is growing dramatically.

The memberships of organizations such as the National Audubon Society,<sup>1</sup> the amount of time people devote to bird watching and other wildlife oriented activities exclusive of hunting and trapping,<sup>2</sup> and the time and space committed

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<sup>1</sup>National Audubon Society membership in December, 1973 was 291,852 and has more than doubled in the last five years.

<sup>2</sup>The National Survey of Fishing and Hunting (U.S. Department of Interior, 1970) reported that birdwatching, wildlife photography, and nature walks accounted for 786,291,000 recreation days compared with 203,689,000 recreation days for hunting.

to wildlife programs and articles by the popular media, are all indicators of the importance of nonconsumptive wildlife values to Americans and they all appear to be increasing. The welfare of wild animals has become a cause—an intrinsic good—with a very vocal and apparently growing segment of the population. The concerns of these people must be acknowledged by wildlife policymakers.

### *Opposition to Hunting and Trapping*

A separate but undoubtedly related development has been the rapid growth of hunting opposition. As recently as nine years ago, wildlife professionals were first beginning to comment on this phenomenon but at the time we were unaware of the significance of the movement to outlaw hunting (Leonard 1965).

Today there is no longer any uncertainty concerning the importance of this movement. No less than 25 organizations with anti-hunting positions have been identified (Frodelius 1973). Legislation outlawing certain types of trapping is pending in several states, and anti-hunting sentiment is widespread among college students (Shaw 1973). For a variety of reasons including hunting opposition, more and more private land continues to be posted to prohibit hunting and in some areas entire townships are considering the possibility of forbidding all hunting within their boundaries. The importance of these developments to wildlife managers is obvious and a concerted effort should be made to understand these social processes.

The growing controversy concerning the moral justifications for hunting and trapping has stimulated some persuasive ethical discussions (Zern 1972; Ortega y Gasset 1972; Klein 1973; Shepard 1973; and others), but our understanding of why people oppose hunting is still limited. It is, first of all, important to recognize that hunting opposition is not an isolated cause. For many anti-hunters, hunting is just one of a range of concerns including inhumane treatment of pets, poisoning and trapping of predators, certain livestock raising practices, slaughterhouse procedures, and laboratory experiments using animals (Godlovitch et al. 1972). Many of the ways that we, as a culture, use animals are being critically examined and hunting is just one of them. This broad coalition of concerns for animal welfare is gaining influence rapidly and has already been coined the "animal liberation movement" with its objective of eliminating "speciesism" or discrimination against nonhuman species from our culture (Singer 1973).

There are undoubtedly many social trends which are related to changes in the ways Americans value wildlife resources. Some of the most important include; urbanization and its associated isolation from nature, pacifism and anti-violence sentiment fostered in part by our recent involvement in an unpopular war, increasing demands for gun control generated by spiralling crime rates, and the environmental movement which in many cases has produced protectionism rather than conservation or wise-use philosophies (Leonard 1972). Clearly, if we are to understand how and why wildlife values are changing, we must recognize the importance of these and other factors as determinants of wildlife attitudes.



## **Wildlife Attitudes as Adaptations to Change in Supply of the Resource Relative to Numbers of Humans**

The task of quantifying the various social trends related to wildlife attitudes is a formidable one and perhaps it is not entirely necessary. There may be two fundamental and readily quantifiable processes which can tell us more about how wildlife attitudes can be expected to evolve than all of these other factors.

1. Human population is increasing and can be expected to continue to increase for at least the next couple of decades.
2. The supply of wildlife habitat and hence wildlife is decreasing and will probably continue to decrease as long as human population and environmental impacts grow.

The ability to adapt to changes in the environment culturally, in addition to genetically, is a unique human attribute which may explain a great deal about our relationships with wildlife resources. Changes in the ways Americans value wildlife may be largely manifestations of cultural evolution in response to changes in the supply of the resource relative to human numbers. This relationship between human population and wildlife supply has exhibited a consistent trend since the settlement of this continent and wildlife attitudes have evolved correspondingly.

### **Historical Review of Principle American Wildlife Values**

There are three important ways in which Americans have used and valued wildlife resources.

1. Utility or nuisance value (meat, furs, crop and livestock depredation, etc.).
2. Consumptive recreational value (sport hunting).
3. Aesthetic or existence value (viewing, studying, photographing, satisfactions from just knowing wildlife exist, recognition of ecological importance of wildlife, etc.).

Throughout the history of this country, the relative importance of each of these values has been constantly changing as human population has increased and wildlife supply has decreased.

Originally, wildlife were numerous and people were few. Although there was undoubtedly some aesthetic appreciation of wild animals and some pleasure derived from hunting, these values to the culture as a whole were secondary to the utility or nuisance value of the resource. Wildlife were most important as sources of meat, furs, and other products or as threats to livestock and crops or human safety.

These primary values were reinforced by the philosophical views of early Americans. The traditional Western view has been that man's appropriate role on earth is to "multiply and subdue." To this, Americans added an explicit qualification in reaction against the European tradition of resource control by an aristocracy. In this country, all men should have equal rights to exploit the earth's resources.

The supply of wildlife seemed boundless and our philosophical heritage encourages ruthless exploitation. Considering these facts, it is not surprising that for much of this country's history, perhaps until the late 1800's or early 1900's,

the most important values of wildlife were its utility in providing animal products or the damage caused by wildlife to crops and livestock.

In the early part of this century, a new type of wildlife value assumed prominence. The utility and nuisance values of wildlife declined as the vast concentrations of animals were eliminated. The supply of wildlife had been drastically reduced, but there was still plenty of habitat, especially for species that could tolerate or even benefit from some degree of environmental alterations by man. Given protective legislation and the development of a science of wildlife management, many species replenished themselves and were able to produce an annual harvestable surplus. The most important wildlife product became an intangible one — the recreational benefits of sport hunting. Hunting became a national pastime — a tradition that has dominated wildlife values and management policies for most of this century.

Human numbers and environmental impacts have continued to increase at the expense of wildlife habitat and hence wildlife numbers. In addition, urbanization has concentrated people in metropolitan areas in which only a few species of wildlife can exist. As this relationship between human numbers and wildlife has changed, so too have our attitudes toward this resource. It appears now that, in the culture as a whole, the aesthetic and existence values of wildlife are replacing consumptive recreation as the most important uses of wild animals.

For many urban or suburban Americans, wildlife have become a scarce resource — something that is seen on television, in zoos, or on a once-in-a-lifetime trip to Yellowstone. As such, the aesthetic and existence values of the resource have increased dramatically and can be expected to continue to increase as long as viewing wildlife becomes an unusual experience for more and more Americans. It is human nature to attach the highest value to the scarcest resource and wildlife is no exception.

## **Conclusion**

The purpose of this discussion has been to provide a conceptual framework for what is obvious to most of us — that public attitudes toward wildlife and hunting are changing significantly. I have suggested that the dominant contemporary developments in the ways that Americans value wildlife can be viewed as manifestations of a coherent process of cultural evolution in which the primary determinants are human population and the supply of wildlife resources. Of course this is a simplification of a very complex process. Nevertheless it is useful for it emphasizes two important facets of wildlife policy decisions which have been neglected; the importance of cultural processes in determining how a resource should be managed and the need for a flexible and futuristic orientation to wildlife resource planning.

Too often, our only response to changes in public demands for wildlife management has been defensive. Hence, when our policies which overwhelmingly stress managing wildlife for hunting are questioned, the typical response has been to expand information and education programs stressing the biological justifications for hunting. Such a response may be appropriate (although its effectiveness seems quite limited), but alone it is not enough. It should be combined with an aggressive attempt to understand why the public is not

satisfied and what we can do to broaden our scope of activities and expand our base of public support.

I am not suggesting that we abandon our obligations to sport hunters. We are all aware of the contributions sportsmen have made to conservation activities that have often benefited nongame as well as game species. Furthermore, we believe that using the scientific principles of wildlife management we can provide for hunting recreation without depleting game stocks. What I am suggesting is that we treat conflicting interests as legitimate viewpoints and that we make a greater effort to serve the growing segment of the population that is concerned with the welfare of wildlife but does not hunt. It is all too tempting to assume that hunting opposition is simply the result of ignorance concerning the biological justifications for hunting. Sociological phenomena are seldom so simple. For whatever reasons, attitudes toward wildlife and hunting are changing and if wildlife managers are to serve the best interests of the public, we too must change.

The values of wildlife to society must ultimately be measured in human, not biological terms. The goal of wildlife management should be to maximize human benefits from wildlife within the framework of biological feasibility and these benefits are often abstract, intangible, and subject to change over time.

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# Attitudes of College Students Toward Hunting

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### Introduction

One of the interesting social phenomena of our time is that sport hunting of wild animals has, almost overnight, become unacceptable to increasing numbers of people in our society. This is especially intriguing because hunting is one of man's oldest traditions, and, until relatively recent times, was a necessity for survival.

Empirical evidence which points to increasing negative attitudes toward hunting and hunters includes increasing numbers of movies and TV programs carrying social commentaries against hunting, appearance of legislative proposals to limit or ban hunting, opposition to hunting voiced by organizations, public expressions against hunting voiced by individuals, increasing amounts of dialogue relative to the subject at wildlife-oriented meetings, and increasing space devoted to the defense of hunting and hunters in publications aimed at the hunting public.

If sentiment against hunters and hunting is increasing significantly, as indicated by this evidence, then two basic questions are raised: (1) what are the *reasons* for people being against hunters and hunting, and (2) what are the *basic influences* which cause adoption of such attitudes or opinions?

In 1972 and 1973, grants were provided by the National Rifle Association and Welder Wildlife Foundation to conduct research to help answer these two questions.

### Research Design

The first task was to select a public, or population, which could be surveyed and analyzed statistically, which would be expected to have a definite position regarding hunting, and whose members would be expected to have a significant impact, now or in the future, on the hunting question. College students in the United States were chosen as the survey population because:

1. The under-30 age group was believed to have more anti-hunting sentiment than those older.
2. Philosophical, ethical, or moral opposition was believed to pose the greatest threat to hunting; it was anticipated that college students would hold a high degree of such opposition if indeed it did exist.
3. Today's college students are an important population because many of tomorrow's local, state, and national leaders will come from these ranks and will be articulate in expressing their opinions.

4. College students, it was believed, would be open and free in expressing opinions.

The second phase of the investigation involved designing a vehicle to collect the desired information and to structure the survey so it would be statistically sound. A written questionnaire was designed and pretested on 200 college students at Colorado State University; three revisions were made as a result of pretesting.

Two methods of administering the questionnaire were tested—the first involved having class instructors hand out the document in the classroom and return completed copies to the investigator and the second was to have the researcher give the questionnaire in person to a class of students after briefly explaining the purpose of the study. Results from the second method were more satisfactory from the standpoint that students did a far more complete job of filling out the document when the investigator appeared before them in person.

In selecting the sample population, the United States was stratified into five geographical regions. Names and addresses of all colleges and universities within each region were obtained and two institutions were selected at random from each. Permission to visit these and give the questionnaire was obtained from administrative officers.

Course catalogs for the 1973 Spring quarter or semester were secured from selected schools. Departments listed in each catalog were numbered consecutively and four departments per school were chosen at random. Courses within each of these departments were numbered consecutively and one course was selected at random per department. Final step in the selection process was to obtain permission from instructors of selected courses to visit their classrooms and give the questionnaire in person.

The questionnaire was administered in January and February of 1973; institutions visited included The University of Maine at Machias, Emerson College in Boston, Massachusetts, Methodist College at Fayetteville, North Carolina, Florida Technological University at Orlando, The University of Tennessee at Nashville, Purdue University at Lafayette, Indiana, The University of Missouri at Columbia, Kearney State College at Kearney, Nebraska, The University of Washington at Seattle, and Southern Oregon College at Ashland, Oregon.

### **Survey Results**

Of the 937 students completing the questionnaire, 56 percent were male and 44 percent female. Over half of the students came from communities of 50,000 or less and just over a fourth were from rural areas. These statistics correspond closely with national data available for college students.

Slightly less than half of the male students surveyed were hunters and six percent of the females hunted. Compared with their parents, boys were more likely to hunt than their fathers and girls were slightly more inclined to hunt than were their mothers. Where fathers didn't hunt, less than a third of their sons hunted, while over three-fourths of the boys hunted if their dads engaged in the sport. Only 1 percent of the girls hunted if their fathers didn't, but 14 percent were hunters if their dad hunted. Where both parents hunted, all their

sons hunted and the percentage of female students who engaged in hunting rose to 44 percent, an increase of 38 percent over the average for all female students.

A total of 161 students reported they once hunted but quit. Lack of time was the major reason cited for this, followed by "Don't want to kill animals" and "No longer interested." If the number of students who reported they now hunt are added to those who once hunted but quit, the latter represents 61 percent of the total.

Most students adopted a middle ground in their over-all attitude toward hunting. Only 15 percent of the boys and 24 percent of the girls reported they were totally against hunting; 25 percent of the boys and 3 percent of the girls saw nothing at all wrong with the sport, while the remaining 60 percent of the males and 73 percent of the females stated they were neither all for or all against.

Three-fourths of all students surveyed expressed some degree of anti-hunting or anti-hunter sentiment. Using a 7-point scale, students were asked to rate their sentiment from very strong to very weak. Thirty-four percent of the boys and 55 percent of the girls who responded rated their anti-hunting sentiment on the strong end of the scale while 11 percent of the males and 16 percent of the females rated their sentiment mid-way, or moderate. Twenty-one percent of the males and 16 percent of the females said their degree of sentiment was weak. A third of the boys and 13 percent of the girls did not rate their sentiment.

When asked to vote on whether all sport hunting should be banned, males voted not to ban it by a margin of 4 to 1; girls did not favor a ban by the margin of 6 to 4. One comment added by some students was to the effect that although their value system did not permit them to hunt, they would not attempt to keep others from hunting.

On the original questionnaire used during pretesting, an open-end question was used to get a list of reasons why students might be against hunting. The question read, "If you are against hunting, what are your reasons?" A blank space was provided for the student's response. From all reasons given on the 200 pretest questionnaires, a list of the 20 most common was compiled and placed on the final questionnaire. Students could place a check by any of these they believed; a blank was also provided where any other reasons or comments could be written. Few new reasons were written in the blanks but many comments were made expanding on the reason or reasons checked. Results of responses made to this question are presented in Table 1.

A second major objective of the study was to find out, if the student had a reason for being against hunting or hunters, what happened during his life which caused adoption of such attitudes. Students had two opportunities to reflect negative or anti-hunting influences--one consisted of a list derived from the pretest which could be checked and commented on and the other was simply a blank where the student could write anything desired. Some 1,689 checks and/or comments were made; in addition, about 40 percent of the students chose to add statements of their own.

Television and personal experiences tied for high among influences, with 38 percent of the students reporting that one or both of these had influenced

**Table 1. Reasons students gave for being against hunting.**

Reason	Percent Of Students Who Believed The Statement		
	Males	Females	Average
Sport hunting endangers some species	55	77	66
Don't believe in trophy hunting	57	74	65
Don't believe in killing for pleasure or sport	45	70	57
Too much game meat is wasted	46	56	51
Too many hunters are game hogs	45	53	49
Hunting is cruel to wild animals	21	41	31
Animals have no chance against guns	23	38	30
Too many people are shot while hunting	20	31	26
Killing wild animals upsets nature's balance	17	33	25
Hunting damages the environment	20	30	25
Don't like to see animals shot	17	29	23
There are too many hunters	23	21	22
I'm against guns	12	25	18
Hunters damage property	18	19	18
No wild animal should be killed	11	22	17
All life is sacred	8	15	11
Hunting is violent and I'm against violence	7	14	10
Hunters think they're a supreme breed	11	10	10
All animals are too scarce to hunt	6	12	9
Hunting is anti-social	3	4	3

them against hunting. Personal experiences affected male students the most while TV was a major influence on the girls.

TV programs listed by students as having caused them to be against hunting were, in order of frequency listed, *Wild Kingdom*, *American Sportsman*, *Clubbing of Baby Seals*, *National Geographic*, *Disney productions*, *Jacques Cousteau*, and *Lassie*. Personal experiences included enjoy seeing animals too much to kill them, have seen game meat left to spoil, felt sorry for the animal after it was killed, witnessed cruelty to animals during the hunt, and hunters too often abuse their privileges.

The number three influence most frequently listed was parents; 27 percent of the students stated that parents had caused them to be against hunting. Common comments were, "My parents taught me not to kill anything that I really don't need" and "My mother doesn't believe in hunting."

Movies were the fourth major anti-hunting or anti-hunter influence. In order of frequency listed, the most important movies in this category are *Bless The Beasts and Children*, *Disney productions*, *Born Free*, *Deliverance*, and *African Safari*.

Magazines ranked fifth. Listed were sporting magazines such as *Sports Afield*, *Field and Stream*, and *Outdoor Life* as the major influence, followed by *National Geographic*, *Life*, and *Time*.



Other influences of minor importance were friends, newspapers, organizations, school teachers, and radio. Fewer than 12 percent of the students rated any of these as influences.

Twenty-one percent of the respondents wrote comments criticizing specific actions of hunters as a negative influence. Second in rank among volunteered comments concerned moral issues involved in killing wildlife. A fifth of the students surveyed stated they believed it necessary to practice population control for some species of wild animals.

### **Anti-Hunting vs. Anti-Hunter Sentiment**

From a survey of literature, from the student survey, and from discussions with students during the survey, it appears that negative responses to sport hunting can logically be divided into two distinct components—*anti-hunting* sentiment and *anti-hunter* sentiment.

Anti-hunting sentiment (anti-kill) involves the individual's value system or value sets and is concerned with philosophical concepts or abstracts such as morals, ethics, ideals, and religion. Anti-hunting value systems differ from those of the pro-hunter in areas of killing wild animals for sport or pleasure, cruelty to animals, sacredness of life, the rights of man in relation to nature, points of view on the environment, and appreciative vs. consumptive use.

Increasing anti-hunting sentiment is apparently part of the trend away from the traditional view of consumptive use of natural resources and toward a preservationist, or appreciative philosophy, which in turn reflects a changing set of social values among many citizens in this country. The preservationist philosophy calls for high priorities to be placed on wildlife uses such as viewing, photographing, or just knowing the animals are there and will not be hunted. The appreciative concept implies that all things wild can be stockpiled and saved until a great abundance exists.

In correlating reasons for being against hunting with size of home community and with whether the student hunts, philosophical opposition (anti-hunting sentiment), was found to be strongest among those from large population centers and among those who don't hunt.

Anti-hunter sentiment reflects negative attitudes toward the conduct of some individuals who participate in the hunt. Conduct which generates anti-hunter sentiment includes disregard for and damage to property of others, violation of game laws, and the wounding or killing of people.

Correlations from the student data show that anti-hunter sentiment is strongest among those from small towns, rural areas, and among students who hunt. Philosophical concepts, or anti-hunting sentiment, was weak among these groups.

### **Summary**

1. A point of major interest is that the student survey did not reinforce the hypothesis that philosophical opposition poses a major threat to sport hunting. Though college students have a reputation for being idealistic, or philosophically oriented, those students surveyed appeared to be considerably more concerned with pragmatic rather than philosophical issues concerning sport hunting.

2. The top five reasons for being against hunting, endorsed by approximately half or more of the students surveyed, were:

- a) sport hunting endangers some species
- b) don't believe in trophy hunting
- c) don't believe in killing for pleasure or sport
- d) too much game meat is wasted
- e) too many hunters are game hogs

3. The mass media, primarily movies and TV, were highly influential in causing negative attitudes toward hunting. Personal experience was the other major influence, along with the influence of parents.

4. Students who hunt were far more critical of hunters than were those who don't hunt. Where philosophical opposition was voiced, it came primarily from students living in metropolitan areas.

5. Those interested in further study of the hunting controversy should consider the possibility that two major components do exist—*anti-hunting* and *anti-hunter*.

# Attitudes of South Dakota Residents Toward Dove Hunting

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## Introduction

In South Dakota, the mourning dove (*Zenaidura macroura*) has been considered a nongame species since the turn of the century. Since that time, bills frequently were introduced before the South Dakota Legislature to change the status of the bird. However, it was not until 1967 that legislation was passed designating the mourning dove as a game bird.

The South Dakota Department of Game, Fish and Parks set a 5-day hunting season on the mourning dove in September, 1967, and had an annual season through 1972. In 1972, South Dakota residents in the November general election voted by referendum against continued mourning dove hunting.

The negative vote was a surprise to many hunters and game managers. A research project to examine the mourning dove issue was developed cooperatively by the South Dakota Cooperative Wildlife Research Unit and the Department of Rural Sociology, both located at South Dakota State University. The field work was completed during the summer of 1973, and this paper concerns the following problem:

How much of the variability in respondents' behavior with regard to the mourning dove hunting issue can be explained by socio-economic status characteristics, related attitude and belief patterns, and relevant knowledge levels of the respondents?

## Objectives

The research objectives guiding the development of this paper are:

1. To determine how residents of South Dakota would vote on the mourning dove referendum if it were coming before them today.
2. To determine the intensity of the respondent's commitment to his indicated stand on the mourning dove issue.

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3. To determine the relationship between the respondent's intensity of commitment and his socio-economic status characteristics, related attitude and belief patterns, and relevant knowledge level.

#### *Sampling and Collection of Data*

A statewide list of all persons paying personal property taxes in South Dakota in 1973 was secured and edited to remove duplications, non-resident owners, and corporations. This yielded a list of taxpayer households for the State of South Dakota. Indian Reservation households were sampled from tribal listings of reservation families.

A random sample of 0.25 percent of these households was computer selected, and personal interviews were conducted with the heads of these households by trained interviewers during the summer of 1973. A prepared and pre-tested listed schedule of 10 pages was used to assure collection of comparable data regarding respondent's social and economic characteristics together with measures of their attitudes to selected factors associated with dove hunting. A Likert-type seven point scale was used for most attitudinal measures. Data from 474 schedules were computer processed.

### **Findings**

#### *Objective One – How Respondents Would Vote Today*

Twenty-six percent (125) of the respondents would vote *for* a mourning dove season, sixty-one percent (288) of the respondents would vote *against* a season, and thirteen percent (61) were undecided as to how they would vote.

#### *Objective Two – Intensity of Commitment*

Of the 125 respondents who indicated they would vote *for* a mourning dove season, 60 percent (75) stated they would be willing to encourage others to vote as they, whereas 40 percent (50) said they would not be willing to encourage others.

Of the 288 respondents who indicated they would vote *against* a mourning dove season, 75 percent (216) stated they would be willing to encourage others to vote as they, whereas 25 percent (72) said they would not be willing to encourage others.

Respondents willing to encourage others to vote the same as they would vote were asked to indicate which of the following actions they would be willing to take:

1. Talk with friends about the issue.
2. Contribute money to a campaign.
3. Talk to organizational meetings.
4. Organize a group to influence voting.

Respondents who were either *for* or *against* dove hunting and ready to encourage others to vote as they would vote (Table 1) were more willing to:

1. Talk with friends about the dove hunting issue than to contribute money for a campaign.
2. Contribute money for a campaign than to talk to organizational groups.

**Table 1.** Responses by frequency and percent to the question: “As one who has indicated that you would be willing to encourage others to vote the same as you on the mourning dove issue, which of the following actions would you be willing to do?” Factor weights are those statistically appropriate for affirmative replies to the four choices of action.

	Group I For dove hunting and willing to encourage others (N=75)		Group II Against dove hunting and willing to encourage others (N=216)	
	Yes Response	Factor Weight <sup>1</sup>	Yes Response	Factor Weight <sup>1</sup>
Would talk with friends about issue	73 (97%)	0.48	214 (99%)	0.36
Would contribute money for campaign	45 (60%)	0.69	114 (53%)	0.74
Would talk to organizational groups	33 (44%)	0.77	78 (36%)	0.75
Would organize a group to influence voting	27 (36%)	0.80	58 (29%)	0.82

<sup>1</sup>Factor weights for those willing to encourage others to vote as they would vote summed to 2.74 for Group I and to 2.67 for Group II.

3. Talk to organizational groups than to organize a group to influence voting.

#### *Objective Three – Relationship Between Commitment and Other Variables*

Objective Three was to determine the relationship between the respondent's intensity of commitment and his:

1. Socio-economic status characteristics.
2. Related attitude and belief patterns.
3. Relevant knowledge level.

For purposes of analysis, the sampled respondents were assigned into two sub-groups (Table 1) according to the following criteria:

1. Group I: composed of 75 respondents who indicated they would vote *for* a mourning dove season and would also be willing to encourage others to vote as they would vote.
2. Group II: composed of 216 respondents who indicated they would vote *against* a mourning dove season and would also be willing to encourage others to vote as they would vote.

The following were designated as dependent variables (Y) for both groups:

A.  $Y_{pro}$ : The sum of the weighted values determined as statistically appropriate to assign for each affirmative reply by a Group I respondent (Table 1) for dove hunting to the following four statements:

1. Would you be willing to talk with friends about the issue?
2. Would you be willing to contribute money to a campaign?
3. Would you be willing to talk to organizational meetings?
4. Would you be willing to organize a group to influence voting?

B.  $Y_{con}$ : The sum of the weighted values determined as statistically appropriate to assign for each affirmative reply by a Group II respondent (Table 1) against dove hunting to the same four statements.

Six multiple regression selections were run, three for Group I with  $Y_{pro}$  as the dependent variable and three for Group II with  $Y_{con}$  as the dependent variable.

Selection I incorporated  $Y_{pro}$  and the following independent socio-economic characteristics of the respondent:

$X_1$ , sex;  $X_2$ , race;  $X_3$ , head of household status;  $X_4$ , age;  $X_5$ , higher grade completed in school;  $X_6$ , marital status;  $X_7$ , respondent's occupation, including retired;  $X_8$ , spouse's occupation, including housewife;  $X_9$ , rural-urban residence;  $X_{10}$ , type of dwelling;  $X_{11}$ , length of residence at present address;  $X_{12}$ , length of residence in county;  $X_{13}$ , income;  $X_{14}$ , number of children living at home;  $X_{15}$ , extent of participation in community organizations;  $X_{16}$ , extent of participation in nonhunting water sports;  $X_{17}$ , hunting, fishing and conservation magazine readership;  $X_{18}$ , extent of participation in conservation or outdoor sports groups;  $X_{19}$ , number of different South Dakota game species hunted;  $X_{20}$ , extent of participation in non-profit wildlife programs;  $X_{21}$ , firearms safety course trainee;  $X_{22}$ , veteran status;  $X_{23}$ , membership in a family, one of whom has been convicted for game law violation.

Selection II incorporated  $Y_{con}$  and the same independent socio-economic characteristics  $X_1, X_2, X_3, \dots, X_{23}$  as defined above.

Selection III incorporated  $Y_{pro}$  and independent variables  $X_{24}$  through  $X_{51}$ , consisting of Likert-type statements that attempt to measure the extent to which the respondent agrees or disagrees that:

$X_{24}$ , hunting helps preserve the balance of nature;  $X_{25}$ , hunting benefits the general economy of South Dakota;  $X_{26}$ , too much land is set aside for public hunting;  $X_{27}$ , there should be more restrictions on hunting;  $X_{28}$ , nonresidents should not be allowed to hunt in South Dakota;  $X_{29}$ , all hunting should be banned in South Dakota;  $X_{30}$ , most hunters damage property during the hunting season;  $X_{31}$ , most hunters follow good sportsmanship practices;  $X_{32}$ , most hunters kill primarily for the meat the game provides;  $X_{33}$ , hunters are persons who just like to kill animals;  $X_{34}$ , most hunters don't make use of the game they shoot;  $X_{35}$ , the hunters satisfaction comes mainly from hitting the target;  $X_{36}$ , game regulations in this state are strictly enforced;  $X_{37}$ , game wardens enforce game laws fairly;  $X_{38}$ , the Department of Game, Fish and Parks usually makes decisions without considering the needs of the general public;  $X_{39}$ , the Game, Fish and Parks Department personnel are the best qualified to make decisions about hunting regulations;  $X_{40}$ , to do their job

effectively, wildlife managers should be college trained;  $X_{41}$ , South Dakota laws allow the killing of too many wild animals;  $X_{42}$ , State regulations are conserving wildlife populations effectively;  $X_{43}$ , all hunting should be regulated by the Federal Government;  $X_{44}$ , the game laws in South Dakota don't serve my interest;  $X_{45}$ , there is nothing people like I can do to change hunting regulations in South Dakota;  $X_{46}$ , hunting seasons on mourning doves would greatly reduce their number;  $X_{47}$ , there is not enough meat on the mourning dove to bother hunting it;  $X_{48}$ , most doves killed during a hunting season would probably die within the year anyway;  $X_{49}$ , most people who hunt doves deliberately shoot other game which is not in season;  $X_{50}$ , hunting seasons on mourning doves would bring about their extinction;  $X_{51}$ , the mourning dove should be classified as a songbird.

Selection IV incorporated  $Y_{con}$  and the same independent variables  $X_{24}$ ,  $X_{25}$ ,  $X_{26}$ ... $X_{51}$  as defined above.

Selection V incorporated  $Y_{pro}$  and independent variables  $X_{52}$  through  $X_{58}$ . Likert-type statements that attempt to test the extent to which the respondent agrees or disagrees that the following cognitive measures are true:

$X_{52}$ , mourning doves are a game bird in most of the United States;  $X_{53}$ , mourning doves damage crops;  $X_{54}$ , the principal diet of mourning doves is insects and grubs;  $X_{55}$ , mourning dove hunting is legal in South Dakota;  $X_{56}$ , during the last 6 years, South Dakota's dove population decreased;  $X_{57}$ , shelter belt development is essential for maintaining an adequate mourning dove population;  $X_{58}$ , over half of the mourning doves alive now will be dead next year due to natural causes.

Selection VI incorporated  $Y_{con}$  and the same independent variables  $X_{52}$ ,  $X_{53}$ ,  $X_{54}$ ... $X_{58}$  as defined above.

The null-hypothesis that the set of independent variables  $X_1$ ,  $X_2$ ,  $X_3$ ... $X_k$ , will not contribute significantly to the explanation of the variation observed in the dependent variable was tested for the six regression selections at the 0.05 level of probability (Table 2).

#### A. Socio-economic Characteristics

*Selection I.* Respondents who would vote *for* mourning dove hunting and also were willing to take more action to encourage others to vote as they would vote were characterized by greater participation in community organizations ( $X_{15}$ ).

*Selection II.* Respondents who would vote *against* mourning dove hunting and also were willing to take more action to encourage others to vote as they would vote were characterized by:

1. Greater participation in nonhunting related water sports ( $X_{16}$ ).
2. Greater participation in community organizations ( $X_{15}$ ).
3. Shorter length of residence at present address ( $X_{11}$ ).
4. Lower completed formal education ( $X_5$ ).
5. Greater readership of hunting, fishing and conservation magazines ( $X_{17}$ ).

**Table 2. Sum of squares and proportion of variance accounted for by the significant independent variables (X) in order of importance as entered into the equation, for each dependent variable selection (Y).**

Significant independent variable for each selection	Sum of squares accounted for	Proportion of variation explained	Cumulative proportion of variation explained	Regression coefficient for significant variables	Y-intercept
Socio-economic characteristics					
Selection I.					
( $Y_{pro}$ )					
X <sub>15</sub>	4.670	8.5	8.5	0.06149	1.24071
Selection II.					
( $Y_{con}$ )					
X <sub>16</sub>	6.648	4.3	4.3	0.05796	0.89658
X <sub>15</sub>	5.826	3.7	8.0	0.04784	
X <sub>11</sub>	3.979	2.6	10.6	-0.01039	
X <sub>5</sub>	3.755	2.4	13.0	-0.07461	
X <sub>17</sub>	3.335	2.1	15.1	0.00273	
Attitudes and beliefs					
Selection III.					
( $Y_{pro}$ )					
X <sub>39</sub>	4.826	8.8	8.8	0.17708	-0.10160
X <sub>48</sub>	5.762	10.5	19.3	0.17109	
Selection IV.					
( $Y_{con}$ )					
X <sub>51</sub>	4.094	2.6	2.6	0.10942	0.74006
X <sub>44</sub>	2.938	1.9	4.5	-0.09998	
X <sub>33</sub>	3.317	2.1	6.6	0.09403	
Knowledge about doves					
Selection V.					
( $Y_{pro}$ )					
X <sub>58</sub>	5.360	9.8	9.8	0.35255	0.70417
Selection VI.					
( $Y_{con}$ )					
X <sub>52</sub>	3.698	2.4	2.4	-0.16748	1.57783



## B. Attitudes and Beliefs

*Selection III.* Respondents who would vote *for* mourning dove hunting and also were willing to take more action to encourage others to vote as they would vote were characterized by:

1. Greater agreement that the Game, Fish and Parks Department personnel are the best qualified to make decisions about hunting regulations (X<sub>39</sub>).
2. Greater agreement that most doves killed during a hunting season would probably die within the year anyway (X<sub>48</sub>).

*Selection IV.* Respondents who would vote *against* mourning dove hunting and also were willing to take more action to encourage others to vote as they would vote were characterized by:

1. Greater agreement that the mourning dove should be classified as a songbird (X<sub>51</sub>).
2. Greater agreement that the game laws in South Dakota serve the respondent's interest (X<sub>44</sub>).
3. Greater agreement that hunters are persons who just like to kill animals (X<sub>33</sub>).

## C. Knowledge About Doves

*Selection V.* Respondents who would vote *for* mourning dove hunting and also were willing to take more action to encourage others to vote as they would vote were characterized by greater agreement that over half of the mourning doves alive now will be dead next year due to natural causes (X<sub>58</sub>).

*Selection VI.* Respondents who would vote *against* mourning dove hunting and also were willing to take more action to encourage others to vote as they would vote were characterized by greater agreement that mourning doves are not a game bird in most of the United States (X<sub>52</sub>).

## Discussion and Conclusions

From the findings, we suggest the following conclusions:

1. The residents of South Dakota are strongly opposed to mourning dove hunting; only 26 percent would vote *for* a mourning dove season. This evidence would tend to negate the belief that South Dakotans really favor mourning dove hunting but voted *against* it in 1972 because some voters did not realize a "yes" choice on the ballot would mean the banning of such hunting. The results of this study, 26 percent of the respondents interviewed who would vote *for* the mourning dove season and the 61 percent who would vote *against* it, are quite comparable to the results of the 1972 referendum, 33 percent *for* and 67 percent *against* a mourning dove season.

2. A substantial percentage of South Dakotans, both *for* and *against* hunting mourning doves, would be willing to encourage others to vote as they would. A greater percentage of respondents (75 percent) *against* hunting mourning doves would be willing to encourage others to vote as they would vote than would those (60 percent) *for* mourning dove hunting. However, of those willing to encourage others to vote as they would vote, those *for* mourning dove

hunting had a slightly stronger commitment, as a greater percentage of them would be willing to contribute money, talk to groups, and organize a group to influence voting.

3. In terms of socio-economic characteristics, residents in South Dakota who are active participants in community organizations are those most likely to give leadership either *for* or *against* legalization of mourning dove shooting. Of the respondents who would be willing to encourage others to vote as they would vote, more than one-third of those *for* dove hunting and almost one-third of those *against* would be willing to organize groups to influence others. This would suggest that local organizations contain those community "influentials" from whom to draw resources and to whom education and information efforts should be directed.

4. Attitudes of South Dakota residents that explain voting behavior *against* mourning dove hunting are partially based on misconceptions regarding mourning doves. That mourning doves are not a game bird in most of the United States was one characteristic of respondents *against* mourning dove hunting. Mourning dove hunting is a popular sport in the United States. In 1970, 31 of the contiguous states had an open season on mourning doves, and 17 states did not have an open season (Ruos 1972). In that same year there were an estimated 2,464,000 mourning dove hunters, 21.1 percent of all the small-game hunters in the United States (U.S. Bureau of Sport Fisheries and Wildlife 1970). Reeves *et al.* (1968) pointed out that the dove is the most important game bird in North America, based on annual hunter harvest, and Reeves (1972) stated that the mourning dove is the most widely hunted game bird in the United States.

5. It is difficult to evaluate the finding that respondents *against* dove hunting believed that the mourning dove should be classified as a songbird. Songbird is a term that means different things to different people, and the authors cannot be sure what it implied to many of the respondents. Some respondents stated that they liked to hear it sing in the morning. Taxonomically the mourning dove is not a songbird: it is a more primitive bird in the taxonomic classification than the songbirds (American Ornithologists Union 1957). The term "songbird" to most of the respondents may have been synonymous with nongame bird.

6. One goal of people *for* hunting mourning doves should be aimed at presenting more information concerning the status of the mourning dove. Respondents *for* dove hunting and willing to encourage others to legalize it believed that most doves killed during a hunting season would probably die within the year anyway and that over half of the mourning doves alive now will be dead next year due to natural causes. This indicates an understanding of wildlife populations since these factors form much of the basis for the ability to harvest game surpluses. Persons *against* dove hunting did not have this perception to the same extent. Advocates of mourning dove hunting need to concentrate on reaching anti-dove season proponents with information concerning animal populations. Sound principles of game management and population characteristics permitting a harvest not only of mourning doves, but all game species, should be explained to the residents of South Dakota.

7. Some of the opposition to mourning dove hunting on the part of residents is based in the belief that hunters just like to kill animals. This was the

only statistically significant characteristic that indicated an anti-hunting attitude on the part of the respondents. Hunters in the state would do well to police their own ranks, to disseminate information concerning their sport, and to convince people that the sport of hunting entails more than merely killing an animal.

8. Even though the belief that hunters just like to kill animals is characteristic of people *against* mourning dove hunting, the survey did not reveal a general attitude of opposition to hunting, hunters, or game management practices. The respondents *against* mourning dove hunting and willing to encourage others to vote as they did were *not* significantly associated with feelings that (1) there should be more restrictions on hunting; (2) South Dakota laws allow the killing of too many wild animals; (3) hunting seasons on mourning doves would greatly reduce their number; (4) hunting seasons on mourning doves would bring about their extinction; or (5) South Dakota's dove population decreased during the last 6 years.

9. During the years of an open season on mourning doves in South Dakota there was much publicity about property damage and bad sportsmanship of mourning dove hunters. However, these factors evidently were not important to South Dakota residents. The variables (1) rural-urban residence, (2) most hunters damage property during the hunting season, and (3) most hunters follow good sportsmanship practices, did not contribute significantly to explaining the varying willingness to encourage others to vote.

10. Dissatisfaction with the Department of Game, Fish and Parks was not evident from the interviews. Those *for* dove hunting were characterized by greater agreement that Game, Fish and Parks Department personnel are the best qualified to make decisions about hunting regulations and those *against* by greater agreement that the game laws in South Dakota serve the respondent's interest.

In summary, we believe that the outcome of the referendum to ban hunting of mourning doves was primarily based upon the incorrect beliefs that mourning doves are not game birds in most of the United States and should be classified as songbirds.

Some of the variables that contributed significantly to the total variation cannot be interpreted without additional analysis. Variables such as greater participation in non-hunting related water sports, greater readership of hunting, fishing and conservation magazines, shorter length of residence at present address, and lower completed formal education will be some of those examined as the analytical phase of this research continues.

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## Panel Discussion

CHAIRMAN LUCAS: Now, at this point, I think we could take a question or two. Do we have one, for example, on the topic of hunting attitudes?

MR. RICHARD HUBBARD [California]: All four papers do not paint a bright future for hunting. However, I wonder if any of the panelists or any of the four individuals would care to comment whether the assumption that hunting has been accepted as a pretty important management tool is paramount, or what should be the role of the wildlife professional in researching these philosophical trends? Do any of them have suggestions as to where the emphasis should be directed in such an effort?

CHAIRMAN LUCAS: Ray, would you like to respond to that, or Dale?

MR. LINDER: In South Dakota, of course, we are dealing with a primarily rural population and I do not get the feeling that it is quite as gloomy as you say. The mourning dove issue is the only thing we have analyzed but we have found no difference between rural or urban, no difference between ages, although some by education and income.

MR. SHAW: I do not intend to answer the gentleman's question completely or even partially. But in this matter of anti-hunting sentiment, however strong it is, to me the important thing, right now, is for the entire hunting fraternity to see if there is a problem. There is beginning to be some documented research into the alleged problem. Therefore, this, at least to me, is a bright spot.

It is important that we in the hunting fraternity find out if there is a problem and what the problem is, and then let's see what we can do about it.

CHAIRMAN LUCAS: Bill Shaw says that he will try to deal with that during the general discussion.

MR. ROBERT SOLEY [Denver *Post*]: I would like to ask Mr. Linder what he thinks the response would have been to his questionnaires if there had been a referendum on pheasant hunting?

MR. LINDER: My opinion is, and I will be pessimistic, that it would be ninety-five percent for the pheasant season in South Dakota.

MR. SOLEY: Why? What is the difference?

MR. LINDER: The experience. The mourning dove has been protected in South Dakota. The season was opened in 1967. With a small percentage of our hunters hunting the mourning dove, there were a lot of people quite easily influenced. However, if it were on the pheasant, it would be a completely different ball game.

CHAIRMAN LUCAS: It seems to me that the mourning dove personifies a meek and mild image — the Dove of Peace — whereas a rooster-pheasant is about as audacious and as arrogant as anything you can find. As a matter of fact, you get the impression that he is just "asking for it." I guess I have revealed my colors.

## **Landowner Attitudes Toward Use of Lands for Recreation—A Panel**

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# **New York Landowners' Attitudes Toward Recreation Activities**

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### **Historical Perspective**

New York State, despite its large population, has an abundance of open country suitable for many types of outdoor recreation activities. Notwithstanding large numbers of public lands, including the Adirondack and Catskill Forest Preserves, hundreds of thousands of recreationists depend upon private lands for hunting, fishing, snowmobiling, and other activities. The very number of these recreationists in combination with their behavior can and often does create conflicts between recreationists and landowners.

The problem of recreationist-landowner conflicts in New York has been a steady concern and an item of periodic study and research for many years by the New York State Department of Environmental Conservation and the New York State Cooperative Wildlife Unit at Cornell. Their most recent study (Waldbauer 1966) showed that approximately 25 percent of private landowners in rural New York had posted their lands in 1963. Reasons given for virtually all posting at that time centered around bad experiences landowners had encountered with hunters.

A combination of factors led to renewed interest in New York's landowner-recreationist conflicts in the early 1970's. A study conducted at Cornell in the summer of 1970 in Tompkins, Broome, and Yates counties (Wilkins and Erickson 1972) indicated about one-half of the landowners contacted had posted their lands. Soon after the analysis of that study, spokesmen for The Wildlife Management Institute and the U. S. Forest Service suggested, concerning provision of sufficient wildlife supplies for hunting, that far too little research emphasis had been placed on determining access to suitable hunting areas. Finally, it was common knowledge that some rural landowners were having bad experiences with snowmobilers, a factor not existent at the time of the 1963 study.

Having the 1963 effort as a base line study of incidence and causes of posting in New York State, it seemed prudent and timely to update that study, and to measure in more detail landowner attitudes toward letting others use their lands for recreation. Accordingly, a new study was cosponsored by the The Wildlife Management Institute, New York State Conservation Council, the New York State Department of Environmental Conservation, and the New York State Cooperative Wildlife Research Unit, and carried out by outdoor recreation staff in the Department of Natural Resources at Cornell University.

## Study Methods

The 1972-73 study examined levels of posting, reasons for posting, and related landowner attitudes in 28 of the same rural<sup>1</sup> New York towns that were studied in 1963. These towns were stratified so that four towns fell within each of seven Department of Environmental Conservation management regions, with no two towns falling within the same county. Names of landowners for the current study were obtained from county court house records by selecting every fourth name of landowners holding at least 10 acres in sample towns. Mail questionnaires were sent to a total of 1,684 rural residents, and 75 percent of those receiving questionnaires responded. A telephone follow-up check was conducted with a sample of nonrespondents.

A rectangular array was developed which permitted landowners to indicate types of recreationists they would allow to use their lands by degree of familiarity with the recreationists. A similar array allowed posting landowners to indicate the reason for posting by type(s) of recreationist involved. Attitudes toward hunting, snowmobiling, and other subjects were measured by a variation of the Thurstone equal-appearing interval continuum. Rather than asking landowners to respond to a statement by indicating a choice from "Strongly Agree" to "Strongly Disagree," each item contained four statements, and by checking the appropriate item, the respondent indicated whether his attitude toward the subject was very positive, somewhat positive, somewhat negative, or very negative. Neutral or undecided choices were not among the options given.

## 1972 Incidence and Causes of Posting

The level of posting in rural New York towns increased from 25 percent of private acreage posted in 1963 to 43 percent posted in 1972. This represents an increase of approximately 72 percent in acreage posted over the nine-year period, or almost 3.5 million acres of land posted since 1963. Of the 42 percent of posting landowners, 97 percent indicated that a behaviorally-related reason on the part of recreationists contributed to their decision to post. Landowners had personally encountered bad experiences with recreationists, friends or neighbors had encountered such experiences, landowners felt recreationists had the reputation of damaging property, or landowners felt endangered by the presence of various recreationists on their property.

While the implications of this study very strongly suggest a need for recreationists to establish better communications with landowners and to improve their behavior while on private lands, one would nevertheless expect various segments of the rural landowning population to have different attitudes toward hunting and hunters, control and management of game, the concept of making private holdings available to others for recreation, and in the northern states, snowmobiling and snowmobilers. Attitudes toward these subjects were investigated, and will be the focus of this paper.

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<sup>1</sup>1960 population of less than 150 per square mile.

## **Attitudes Toward Hunting**

A large majority of rural landowners in New York approve of the concept of hunting as it is legally permitted in the state. Ten percent indicated unconditional approval, while another 68 percent agreed that hunting is all right so long as hunters respect private property and take only legal amounts of game. Twenty-three percent indicated some opposition to hunting—21 percent said hunting should be allowed only when there are large overpopulations of game or when people need game for food. Only two percent felt that man has no right to hunt, and that hunting should not be allowed. These percentages were very similar for posting and nonposting landowners. Total posting, for whatever reason, by landowners with anti-hunting sentiment has raised the statewide posting level by only one and one-half percent.

Attitudes against hunting were found to be most strongly related to landowners having urban backgrounds and owning rural property in areas of population and land use pressures. Forty-three percent of those who were reared in metropolitan areas opposed or had reservations against hunting, and 37 percent of those currently residing in metropolitan centers expressed this sentiment. Similarly, 37 percent of those owning land in the area north of New York City and south of the Catskills indicated reservations or opposition to hunting.

Significantly higher than average anti-hunting sentiment was indicated statewide by several groups: professionals and college-trained landowners, and those earning over \$20,000 per year, female heads of households, and those preferring cross-country skiing and nature study to other outdoor recreation activities. Opposition, or reservations to hunting ranged from 32 percent to 36 percent of these groupings.

Hunting enthusiasm was strongest in rural western and northern New York, where as little as 14 percent of landowners had reservations about the sport. Statewide, hunting was endorsed most heavily by those brought up in a rural area, by farmers, craftsmen and operatives, by those having not more than a high school education, by those having family incomes in the \$6,000 to \$10,000 range, and by landowners who chose fishing, snowmobiling, snowshoeing, and trapping in addition to hunting as recreation activities. Reservations about hunting ranged from 11 percent to 17 percent among the above groups. About nine percent of hunting landowners indicated that hunting should be allowed only when there are large overpopulations of game, or when man needs game for food.

## **Attitudes Toward Hunters**

While most landowners subscribed to the propriety of hunting, many indicated the behavior of hunters was a sufficient problem to cause them to post their lands. Only 11 percent of all landowners, and only 15 percent of hunting landowners could say they had never had a bad experience with hunters. However, an additional 43 percent indicated that while some hunters are careless, landowners are willing to assume a degree of risk to help assure careful hunters of a place to hunt. Thirty-nine percent felt that while most hunters are careful, landowners can't assume the risk of allowing strangers to hunt on their property. Only seven percent indicated the image of hunters as

generally careless people who damage property and are dangerous to have around.

As with attitudes about hunting, there were strong regional differences in attitudes of landowners toward hunters. In the area south of the Catskills, 68 percent indicated enough hunters were careless that landowners couldn't assume the risks of allowing hunting. In northern New York, however, only 35 percent of landowners shared this view. Landowners having metropolitan urban backgrounds seemed least tolerant toward hunters, and southeastern New York has a greater proportion of these landowners than other regions of the state.

Landowner socioeconomic and recreation preference groupings most favorable and least favorable toward hunters are very similar to those described as favoring, and opposing hunting. The major difference is in the degree of sentiment. While only nine percent of hunting landowners indicated any reservation toward hunting, 35 percent do not routinely allow hunting on their property, almost entirely due to bad experiences previously encountered with hunters, or due to their image of the reputation of hunters.

### **Ownership and Management of Game**

Many hunters, including rural landowners, are sometimes frustrated at the lack of access to suitable game habitat and feel that somehow they should be permitted access since game is conceived as a public good. Concurrently, some landowners feel they should have ultimate authority over all actions on their property, thereby reducing game to more of a private good. Landowners were asked to give legislators and management agencies a better understanding of their attitudes on this subject.

The vast majority (75 percent) of landowners preferred a private-public mix of management responsibility. They felt hunters should be required to obtain permission from the landowner to hunt regardless of whether the land is posted. Thus the landowner would retain the option of whether to grant hunting privileges on a case-by-case basis. At the same time, these landowners felt that state game regulations should be continued to protect the supply of game. This position is a slight deviation from current New York law, which does not require a hunter to seek permission to hunt on unfenced lands, but does require the hunter to leave private property upon the landowner's request. The New York State Department of Environmental Conservation currently requests hunters to voluntarily seek permission to hunt on private lands.

Only seven percent of landowners studied felt the landowner should be the sole manager of game resident on his property. Seventeen percent felt the hunter should have the right to hunt open, unfenced lands without obtaining permission, and only one percent felt hunters should have unconditional access to private-rural lands.

The greatest deviation from the above description occurred among northern New York landowners. In this area where open, unfenced lands are common, 30 percent of the landowners felt hunters need not request permission to use unfenced lands, while 59 percent felt hunters should be required to obtain permission. Only 22 percent of statewide hunting landowners felt they should be allowed to hunt open lands without obtaining permission.



## **Public Recreational Use of Private Lands**

Over half (54 percent) of New York's rural landowners indicated some sympathy for the plight of responsible recreationists who need the private recreation resource. While only five percent unconditionally felt that private landowners should make appropriate acreages available to the recreating public, another 40 percent felt that they should open their lands to the public in exchange for better protection against damage to their property. An additional nine percent felt they should open their lands to recreationists who are willing to pay a user fee.

Still, 46 percent expressed the sentiment that "a private landowner's land is his own; it is to his benefit to keep it posted." Responses to other questionnaire items indicate the reason these owners prefer to post is much more strongly concerned with alienation caused by bad experiences with recreationists than with desires for privacy. Thus it is noteworthy that only nine percent of landowners are interested in fees for recreational use. The likely interpretation is that most sympathetic landowners feel they have made little monetary investment toward developing the recreational value of their property, and that imposing a user fee is unwarranted. On the other hand, landowners who are unwilling to open their lands are concerned about personal safety and property damage, and feel charging a fee is no insurance against these concerns. Additionally, landowners may realize that charging a fee imposes some liability for personal injury to recreationists, whereas they are now relieved of general liability considerations when use permission is granted to hunters, fishermen, snowmobilers, hikers, and some other recreation groups without charge.

## **Snowmobiling**

The rise of snowmobiling popularity to a level of over 150,000 registered vehicles in upstate New York in 1972 led us to closely investigate landowner attitudes toward this relatively new activity, knowing that the majority of central New York snowmobiling is done on private lands neither owned nor leased by snowmobilers (Hill 1971). Thirty-one percent of landowners sampled endorsed snowmobiling as a good winter recreation activity, although two-thirds of this group indicated machine noise levels and exhaust systems still need improvement. The majority of landowners (55 percent) had stronger reservations about snowmobiling—indicating that while it can provide a good recreational experience, the machines need engine improvements, they provide a threat to tree seedlings and wildlife, and must be carefully managed. Fourteen percent of the landowners were strongly opposed to snowmobiling as a recreation activity.

Like hunting, snowmobiling was most popular in rural northern and western New York (endorsed by 40 percent), while it was least popular in southeastern New York (endorsed by only 23 percent). It is notable that only 43 percent of snowmobiling landowners endorsed the activity at its 1972 state of development, while 48 percent expressed strong reservations. Other landowning groups most heavily endorsing snowmobiling were big game hunters (39 percent), those in the 36 to 45 age span (37 percent), trappers (36 percent), and operatives and farmers (36 percent). Those groups giving least endorsement to snowmobiling were cross-country skiers (11 percent), those with college degrees

(15 percent), professionals (20 percent), nature study participants (23 percent), and those with metropolitan backgrounds (23 percent).

### **Snowmobilers**

The majority of landowners (54 percent) indicated snowmobilers are irresponsible, and these landowners don't want snowmobilers on their property. Only eight percent held the image that "most snowmobilers are responsible and wouldn't snowmobile on private lands without first asking permission." The remaining 39 percent said that while snowmobilers don't always ask permission to use private property, they are usually careful not to damage property.

Irresponsible ratings of snowmobilers ranged from 44 percent by northern and western New York landowners to 73 percent for southeastern New Yorkers. Landowning groups in which the majority felt snowmobilers to be responsible included hunters, trappers, fishermen, farmers, and those with a rural background. Of these, deer hunting landowners were most tolerant—63 percent felt snowmobilers were responsible. Landowning groups least tolerant to snowmobilers included cross-country skiers and nature study enthusiasts, professional and college-trained groups, and those with metropolitan urban backgrounds.

### **Applicability of Findings to Other States**

While there is a shortage of recent studies of landowner attitudes toward various groups of recreationists, several states have conducted studies of posting. These studies suggest that while there may be a considerably lesser degree of landowner-recreationist conflict in the northern New England states (New Hampshire Fish and Game Dept. 1971), other eastern and central states have had levels of landowner-recreationist conflicts similar to those in New York at the time of those studies: Pennsylvania (Barclay 1966), Massachusetts (Larson 1959), Virginia (Virginia Cooperative Wildlife Research Unit 1973), West Virginia (McIntosh 1967), and Michigan (Outdoor Recreation Resources Research Study Report 6 1962). The New York study shows snowmobiling pressures have combined with hunting and fishing pressures to cause an increasing proportion of landowners to post or otherwise discourage recreational use of their properties. Northern states that have not conducted or updated posting studies since the coming of the snowmobile are strongly encouraged to do so.

Indications from this study suggest the rate of posting is still increasing in New York. At its present level of increase all private lands in New York State would be posted by 1993. This trend will only be changed if conservation leaders begin to plan innovative programs that encourage mutual respect between landowners and recreationists. In addition to its Fish and Wildlife Management Act which permits New York State to negotiate with landowners for public recreation privileges, the State has begun to mount public relations and education programs geared at changing the negative behavior and image of recreationists, and encouraging better communications between recreationists and landowners. These are necessary steps if any sizable proportion of the private resource is to be kept available for recreationists.

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# Utah Landholders' Attitudes Toward Hunting<sup>1</sup>

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## Introduction

It matters little whether we accept the suggestions of Toffler (1970) or the theoretical interpretations of LaPiere (1965) concerning the speed of social change. The forces of change are omnipresent and must be considered by natural resources administrators and wildlife managers just as they are considered by politicians, city planners, engineers, and sociologists.

In the past, appropriate areas for wildlife research involved theoretical and applied biology, specifically with those species designated as game. For the future, it will be necessary to expand the scope to include the investigation of biological problems for all animal species and social implications of consumptive and non-consumptive wildlife use.

The use of land for urban areas, highways and other nonagricultural and nonrecreational uses increased 24 percent from 1880 to 1950. Expectations are that it will continue to increase in accordance with the rise in human population density, affluency and increased mobility. Consider these recent annual acreage conversions for the United States: 420,000 acres for urban development; 160,000 acres for highways, roads, and airports outside urban areas; another 420,000 acres for water reservoirs and flood control; and finally, 150,000 acres for surface mining (either new strip mines or dumping areas) for a total of 1,150,000 acres (USDA, 1971).

As a result of the decreasing availability of suitable nonrestricted land and the increasing number of hunters, game and the privilege to hunt on private land will acquire economic values and cease to be free services of nature. This has begun to happen as evidenced by the increasing number of successful, privately owned shooting preserves.

The *Report of The Committee on North American Wildlife Policy* (Allen 1973) contained an accurate, succinct appraisal of this problem:

Free public hunting has been an assumption with American outdoorsmen. In a sense the hunter has been subsidized by the landowner, who produces something that is common property and from which he may profit little, if at all. Yet access to private land will continue to be our great dependence in taking game crops. Maintaining relationships that will preserve the hunting privilege must be a long-term concern of sportsmen and administrators.

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<sup>1</sup>The authors wish to thank the National Rifle Association and the Wildlife Management Institute for funding, and the Bureau of Sport Fisheries and Wildlife for sponsoring this study.

## **Location of Study**

Because the emphasis of this study was in the area of upland bird hunting, the entire Utah landholder population was not the universe from which the study population was selected. The pilot study and test populations were limited to farmers and ranchers (hereafter referred to as landholders) who controlled land in eight northern and five southern Utah counties. The northern counties were Salt Lake, Weber, Davis, Utah, Cache, Box Elder, Uintah, and Tooele. The southern counties selected for the study were Washington, Wayne, Piute, Iron and San Juan. The landholder population selected represented approximately 75 percent of the agricultural landholders within the 13 counties and approximately 14 percent of all Utah landholders.

## **Methods**

### *Pilot Study.*

A packet containing an introductory letter, self addressed, postpaid return envelope, and a mail questionnaire containing a Likert 5-point attitude index, and questions concerned with posting of private property, land use, and various demographics was distributed in August, 1971. This sample consisted of 100 landholders in Uintah County, a rural, agriculturally oriented county, and 100 landholders in Davis County, an urbanized, industrially oriented county. One follow-up letter was mailed two weeks after the questionnaire.

Data from the pretest Likert scale were subjected to factor and item analyses as checks for internal consistency (Oppenheim, 1966). Only those statements which grouped under the hunting factor with correlation coefficients of 0.90 or better were retained for the final attitude scale.

### *Test.*

A sample of landholders was selected from each county using a standard table of random numbers. The lists of landholders from which the sample was drawn were provided by the Utah Extension Service at Utah State University and included only active farmers and ranchers, not absentee owners.

The test booklet, along with a cover letter explaining the purpose of the project and a postpaid return envelope was sent to each of the 2,076 selected landholders immediately following the 1971 Utah pheasant season. A follow-up letter was mailed to nonrespondents two weeks later. Immediately following the 1972 New Year holiday, a second mailing of the booklet was made to nonrespondents with a revised cover letter and postpaid return envelope. This was followed in 10 days by a final follow-up letter.

## **Results and Discussion**

### *Questionnaire Returns.*

Approximately 53 percent (1,098 returned of 2,076 mailed) of the questionnaires mailed were returned completed. Of those returned, 1,039 contained useable information. This represented a seven percent sample of all Utah landholders.

A bias frequently encountered in mail surveys is nonresponse bias. The basis for this is that people solicited who do not have a relatively strong commitment to the survey topic may tend to respond in disproportionate numbers (Suchman 1962). As an aid to identifying possible areas of bias, a 5 percent sample of nonrespondents was interviewed. The characteristics checked were a) attitude score, b) years of farm experience, c) amount of land controlled, d) years of schooling completed, e) hunter restriction policy, f) upland bird hunter classification. Differences ( $\alpha=0.05$ ) between the respondents and non-respondents occurred only in amount of land controlled and years of schooling completed.

#### *Scores from the Likert Attitude Scale.*

Attitude scores from landholders in the six northern counties were categorized according to the amount of industrialization of their areas. The northern industrial landholders (Salt Lake, Utah, Weber Counties) scored an average of 39.9 of 55.0 possible points. The northern agricultural landholders (Cache, Box Elder, Tooele Counties) scored an average of 40.4 points. The mean score for landholders from all six northern counties was 40.9 points. Landholders from the five southern counties scored slightly higher with a mean score of 41.0 points. T-tests between landholder categories ( $H: \mu_1 = \mu_2$  and  $\alpha = 0.05$ ) showed no significant differences. The average Likert score calculated for all 11 counties sampled was 40.6 points and represents an attitude favorable towards the concept of hunting.

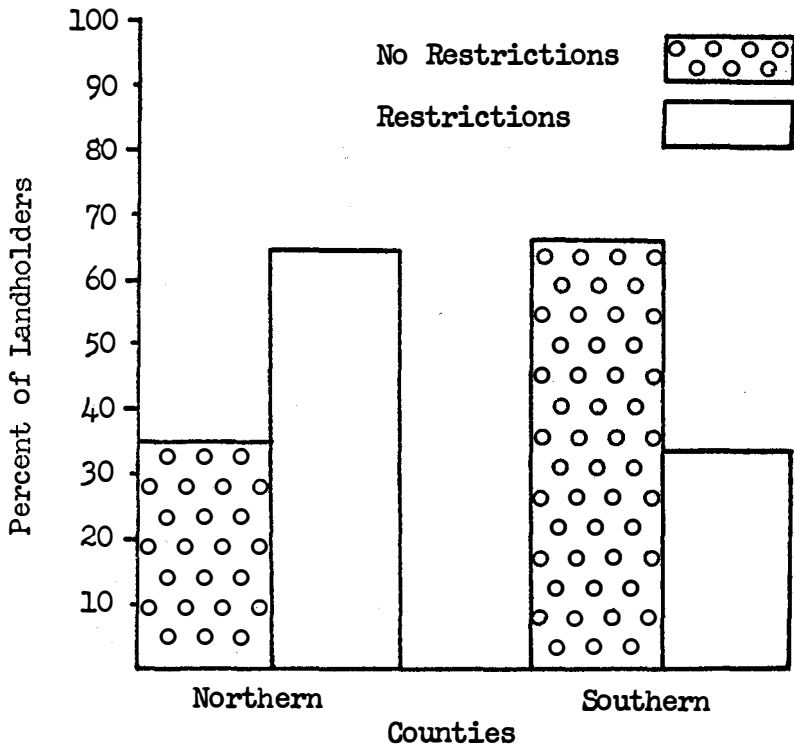
The majority of landholders sampled held attitudes favoring the concept of hunting. Only 4 percent of the landholders showed unfavorable attitudes toward hunting. In terms of upland bird hunting interest, these individuals categorized themselves as *nonhunters*. However they comprised only 27 percent of the *nonhunter* group. Not only is there a large group of landholders who hunt and favor the hunting concept, but there is also a sizable group of nonhunting landholders who favor the concept of hunting.

#### *Restriction of Hunters from Private Property.*

The general policy of restricting hunter access to private land was reversed between northern and southern counties with highest incidence of restriction occurring in northern counties (Fig. 1).

We found no correlation ( $\alpha = 0.05$ ) between the Likert scores and the landholders' tendencies to restrict hunter access to private land. However, by controlling or restriction, a significant ( $\alpha = 0.05$ ) relationship was found between Likert scores and the methods employed by those landholders who did restrict access.

In the northern counties, only 10.5 percent of landholders who restrict hunter access and who had high Likert scores posted NO TRESPASS or NO HUNTING, while 31.4 percent of the landholders with low Likert scores employed this method. For the southern counties, we found 7.3 percent of the landholders with high scores posted NO TRESPASS or NO HUNTING, and 27.3 percent of the landholders with low scores restricted hunters in this manner. Landholders from the northern and southern counties having high Likert scores tended to select the HUNT WITH PERMISSION ONLY method of restriction by a margin of two to one.

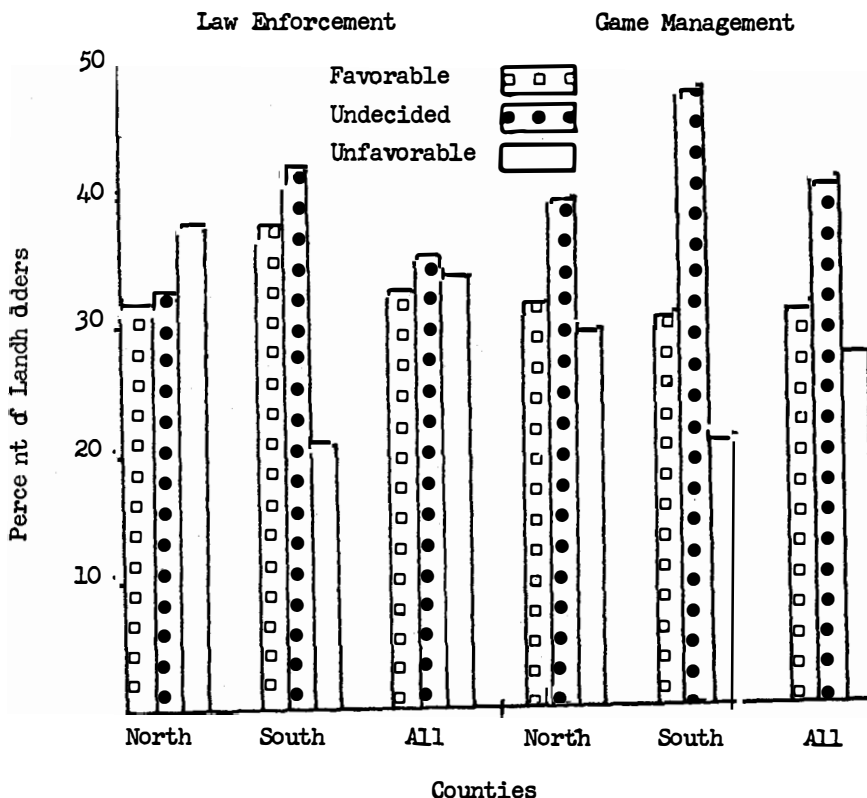


**Figure 1.** The distribution of Utah landholders according to the counties in which they reside and their hunter restriction policy.

State game management agencies are the focus for considerable criticism in regard to their relationship with landholders and the effect on availability of huntable land. To assess the depth of the problem in Utah, we investigated landholder attitudes concerning upland game management and law enforcement during the upland game season (Fig. 2).

Correlations exist between a landholder's Likert score and his attitudes toward law enforcement during upland game season and management of upland bird populations ( $\alpha = 0.001$  and  $0.005$  respectively). Those individuals with high Likert scores view the performance of the State Division of Wildlife Resources as effective, while those landholders with low Likert scores hold the opposite view.

Landholder's attitude toward the State Division of Wildlife Resources proved to be of no value in the northern counties for predicting the tendency to restrict hunters. However, for the southern counties, only 25.3 percent of the landholders with a favorable attitude toward the State Division of Wildlife Resources restricted hunters from their land. Of these, only 17.1 percent used NO HUNTING or NO TRESPASSING as the method of restriction. Those landholders showing an unfavorable attitude to the Division were divided 52.1



**Figure 2.** The distribution of Utah landholders with regard to their county of residence and attitude toward the State Division of Wildlife Resources policies of law enforcement and upland game bird management.

percent who restricted hunters (of which 37.4 percent used the NO HUNTING or NO TRESPASSING technique) and 47.9 percent who did not restrict hunter access.

In an effort to gauge the influence of group pressures on restriction practices, we compared the respondents activities against those of his neighbors. A Chi-square test of independence for the hypothesis "Landholder respondents restrict hunter access independently from their neighbors" was rejected when  $X^2_{0.99;1} = 10.8$ . The calculated  $X^2 = 15.17$  for northern respondents and  $X^2 = 11.96$  for respondents from the southern counties. We therefore conclude that the respondent landholders were influenced by their neighbors restriction policies. Our data, however, were not suitable for discerning correlations between respondents and neighbors with regard to specific restriction methods. It seems only reasonable to suspect that such a relationship does exist.



## Summary

1. Utah landholders viewed the concept of hunting in a favorable manner. There was no statistical difference between northern and southern landholders with regard to their attitudes toward hunting.
2. No correlation was found between a landholder's Likert score and his hunter restriction policy: However, among the landholders who do restrict hunter access and who have low Likert scores, there is the tendency to select the NO HUNTING or NO TRESPASSING method. There is a corresponding tendency among landholders who restrict hunters and who have high Likert scores to select the HUNT WITH PERMISSION ONLY method.
3. Strong positive correlations were found between a landholder's Likert score and his attitudes toward the effectiveness of the State Division of Wildlife Resources programs of law enforcement and upland bird population management.
4. Chi-square tests of independence reveal Utah landholders do not restrict hunter access independently from their neighbors. No correlation could be established between respondent landholders and their neighbors with regard to specific restriction techniques.

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## Panel Discussion.

MR. JOHN KRUTILLA [McLean, Virginia]: I would like to ask Mr. Kitts, since you had both males and females in your referenda, would you suspect any difference in results if you had left two questionnaires at each household, one for the landowner and one for his spouse?

MR. KITTS: That is difficult to answer. Two females responded to our questionnaire as being landowners and their responses were basically no different from the males. However, it is my opinion, yes, we probably would have found a difference if we sampled the females as well as the male head of the household.

MR. ROBERT DENNIS [Virginia]: I am both a hunter and a landowner in Virginia. I am a landowner who has had a great deal of problems with the general hunting public and so have my neighbors. We have had animals shot and people trespassing on land using motor vehicles and a host of other problems.

My land is posted but it is open for hunting and we are pretty selective about whom we allow on there. All over our area within the last few years there has been a strong trend toward hunting by leasing permits, which is not my way of doing it.

One of the things that I and my neighbors consider serious is that the state fish and game agencies seem to be totally unable to deal with the kind of abuses that are taking place. They don't have the authority to deal with it and, on rare occasion when a bill has gotten into the Assembly to provide for legislation, it has been soundly defeated by the hunter interests.

Personally, I do not see any point, as a hunter, in supporting the activities of a bunch of idiots who run around with guns in their hands.

Now, with this preface, my question is this — what do you see as the role of the state wildlife agency in doing something affirmative about the handling of this particular problem?

MR. BROWN: The New York State Department of Environmental Conservation is aware of the problem and they have been working closely with us in mounting public relations campaigns by putting this on radio and television to get the word across to the sportsmen of the state. This very definitely is one needed role of state agencies.

MR. SHAW: I would also like to make a brief comment on that.

I don't think any employee of any wildlife agency likes to see the things that this gentleman described. However, the important point that I would like to make is that the courts have been most lax in taking care of these individuals. Therefore, one of the recommendations that came out of my dissertation was that the courts take a much firmer stand on violators, not only the violators you mentioned but all game-related violations.

MR. ROGER CLARK: I am not sure I want to ask a question. I want to express a concern more than anything.

In listening to these papers that have been given thus far in relation to landowners, hunters and anti-hunters, all of these studies point out some major problems which are facing the wildlife management profession.

These problems suggest to me that they are going to want to change the behavior in relation to all three groups. This being the case, I wonder what research has been done to hook up the attitudes of people with actual behavior in the field? In other words, what are the landowners doing? What are the hunters doing and what are the anti-hunters doing other than responding to questionnaires?

My concern stems from the fact that a great deal of research shows actual behavior probably has a lot more to do with other variables than attitude. Therefore, what kind of factors can you suggest to the profession in terms of alternatives for managers from your data and research? This is something that should be addressed in terms of research perspective — what additional research should be done in the future and how can we best use the information we are putting together in relation to the job we are faced with right now?

MR. SHAW: I think a major responsibility of wildlife managers is that they be better informed on these problems than anyone else. It would seem to me to be a major responsibility of game and fish departments to be sure that hunters are aware of the problem which they apparently are creating.

Secondly, they should be aware of the real threats to this sport and then I think it is up to the hunter to take the action.

CHAIRMAN LUCAS: In response to the question posed by Roger, some of the studies have also had a measure of behavior such as the posting, as well as attitudes. It is also right in line with your question that the propensity to post your land does not seem to be as was predicted by your attitudes toward hunting. There are other constraints or social variables shaping these decisions.

# Economic Survey of Southeastern Wildlife and Wildlife-Oriented Recreation

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From primitive societies to the present industrial age, the various forms of wildlife have played a major economic role. Their function to man has increasingly been changed, and in man's encroachment on their habitat even he has been added to the list of endangered species. As counteraction to wildlife habitat destruction and in order to determine an economic evaluation or measurement of wildlife—such as exists for timber, minerals, water, electric power, grazing, and other resources—an economic survey of wildlife and wildlife-oriented recreation demand was made for the Southeastern United States.

Sponsors of this study include the USDA Forest Service, Region 8; the Tennessee Valley Authority; and the Southeastern Association of Game and Fish Commissioners. Ten states participated. The Wildlife Management Institute was involved in the Steering Committee's function and financial arrangements. The study was partially financed by the Dingell-Johnson and Pittman-Robertson programs through the Southeastern Regional Office of the Bureau of Sport Fisheries and Wildlife.

The monetary values of wildlife established by this study are based on a randomly selected sample of 12,068 Southeastern households. There were 9,322 completed interviews, representing data from 23,577 persons 6 years and older.

## Values

### *Population Estimates*

Monetary evaluation of wildlife was designed to answer the following questions:

- a. What benefit, expressed in dollars, did you receive from a day of fishing, hunting, and wildlife enjoyment?
- b. If you participated, what amount of money would you have required to give up fishing, hunting and wildlife enjoyment?
- c. If you participated, how many days pay did you lose in order to pursue fishing, hunting, and wildlife enjoyment?
- d. If you did not participate, but wanted to, what amount of daily benefit

expressed in dollars would you have assigned to fishing, hunting, and wildlife enjoyment?

Population estimates based on survey data determined that 11 million Southeastern households (out of 16 million) received \$24.2 billion worth of enjoyment from 472 million days of fishing, hunting, bird watching, etc., during the year 1971. On the basis of money required for giving up participation in these activities, 10 million Southeastern households would have demanded \$31.5 billion for forfeiting 438 million days of activity.

Thus, on the average, each household that engaged in wildlife recreation, consumptive or nonconsumptive, received benefits of \$2,183 for the year, or \$51.33 per day of participation. If the participating household had been required to give up its activity, the household would have felt it had lost benefits amounting to \$3,107 for the year, or \$71.90 per day's activity forfeited. See Tables 1 and 2.

#### *Per Day Values*

Three major categories of wildlife use were studied: fishing and hunting (consumptive use), and wildlife enjoyment (nonconsumptive use). Types of each of these three categories were further identified as *fishing*: saltwater, warm freshwater, and cold freshwater; *hunting*: small game, big game, and waterfowl; and *wildlife enjoyment*: bird, animal, and fish/aquatic life watching and photographing. For each of these nine wildlife uses data were obtained for:

- a. benefits received
- b. benefits assigned
- c. value demanded to give up
- d. days pay lost.

Although each of these nine wildlife uses commands different resources, equipment, travel, and other considerations, average reported daily values were combined for a monetary assignment to the major category. For example, values for saltwater fishing, warm freshwater fishing, and cold freshwater fishing were combined for an average monetary value for fishing. Although we are adding apples, oranges, and apricots together, the resulting dollar averages command attention.

The average monetary benefit received by a Southeastern household for a day of fishing is \$42.93; for a day of hunting, \$47.09; and for a day of wildlife enjoyment, \$70.71. See Table 3.

Those who would have liked to but for some reason did not participate during the study year, assigned the following daily monetary benefits: fishing \$28.61, hunting \$28.25, and wildlife enjoyment \$24.52. Each of these three figures is less than the corresponding value given by participants.

The question concerning the value participants would have demanded if required to give up their wildlife activity resulted in the following averages per day of activity: fishing, \$51.76; hunting, \$64.69; and wildlife enjoyment, \$91.31.

Values required to give up participation were highest, benefits assigned were next, and values assigned by nonparticipants were lowest.

The average number of days pay lost to pursue wildlife activities were: 4.4 days for fishing, 3.9 days for hunting, and 6.3 days for wildlife enjoyment. See Figure 1.

**TABLE 1  
VALUE RECEIVED FROM WILDLIFE-ORIENTED ACTIVITIES  
POPULATION ESTIMATES**

Wildlife Activity	Number of Households*	Number of Days (Millions)	Amount of Value Received (Billions)
Hunting	3,762,095	86.2	\$ 3.940
Fishing	6,288,464	211.8	7.903
Wildlife Enjoyment	1,027,319	173.7	12.337
<b>TOTALS:</b>	<b>11,077,878*</b>	<b>471.7</b>	<b>\$24.180</b>

\*Figures in this column are not mutually exclusive as a household may engage in more than one activity.

**TABLE 2  
VALUE REQUIRED TO GIVE UP WILDLIFE- ORIENTED ACTIVITIES  
POPULATION ESTIMATES**

Wildlife Activity	Number of Households*	Number of Days (Millions)	Amount Required to Give Up (Billions)
Hunting	3,540,941	82.5	\$ 5.193
Fishing	5,711,900	199.3	10.979
Wildlife Enjoyment	883,969	156.3	15.328
<b>TOTALS:</b>	<b>10,136,810*</b>	<b>438.1</b>	<b>\$31.500</b>

\*Figures in this column are not mutually exclusive as a household may engage in more than one activity.

Data found in this study, based on interviews of actual users of wildlife resources, are felt to be more significant and indicative for policy making than the \$0.50 to \$6.00 per day net benefits attributed to business in Senate Document No. 97, Supplement No. 1.

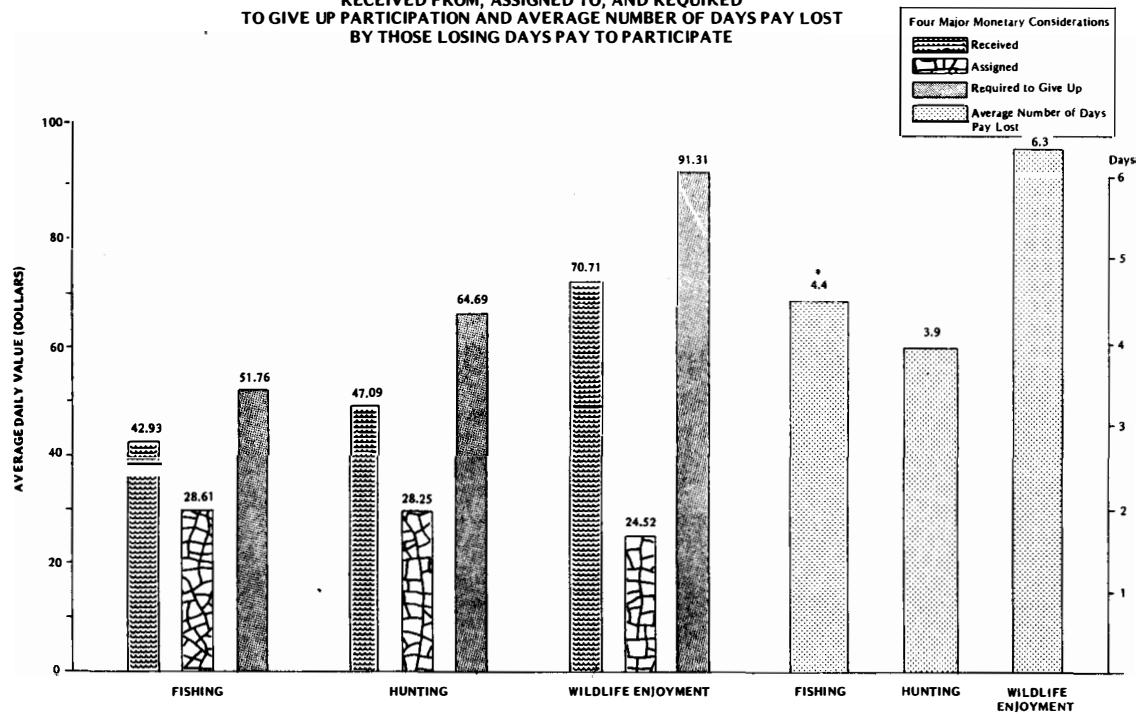
**TABLE 3**  
**UNITARY VALUES OF THE FOUR MAJOR MONETARY CONSIDERATIONS**

USE OF WILDLIFE RESOURCES:	(1) Average Daily Value Received by Participants	(2) Average Daily Value Assigned by Nonparticipants	(3) Average Daily Value to Give Up by Participants	(4) Average No. Days Pay Lost for Participation (by Those Losing Pay)
FISHING*	\$ 42.93	\$ 28.61	\$ 51.76	4.4
Saltwater	59.80	43.69	74.47	
Warm-Freshwater	40.84	17.83	49.28	
Cold-Freshwater	33.58	23.35	39.83	
HUNTING*	\$ 47.09	\$ 28.25	\$ 64.69	3.9
Small Game	39.14	22.37	54.73	
Big Game	60.86	41.34	81.98	
Waterfowl	48.99	20.48	67.24	
WILDLIFE ENJOYMENT*	\$ 70.71	\$ 24.52	\$ 91.31	6.3
Birds	65.40	27.23	81.00	
Animals	80.30	23.81	107.06	
Fish	65.99	21.89	90.49	

Source: Detailed Analysis. Columns: (1) Fishing—Table F-54, Hunting—Table H-44, Wildlife Enjoyment—Table W-27; (2) Table S-29; (3) Fishing—Table F-54, Hunting—Table H-47, Wildlife Enjoyment—Table W-30; (4) Tables F-46, H-42, and W-25.

\*NOTE: Each of the three major wildlife resource use categories consists of three distinct types of wildlife pursuits. For example, saltwater fishing commands not only different resources from those of cold-freshwater fishing; but different equipment, techniques, and other aspects are also involved. Therefore, the combined monetary value of one day of fishing listed above as \$42.93 in reality does not exist, because it is the fruit juice of orange, lemon, and grapefruit, as a combination of salt, warm, and coldwater fishing resource utilization.

**Figure 1**  
 COMPARISON OF AVERAGE DAILY VALUES  
 RECEIVED FROM, ASSIGNED TO, AND REQUIRED  
 TO GIVE UP PARTICIPATION AND AVERAGE NUMBER OF DAYS PAY LOST  
 BY THOSE LOSING DAYS PAY TO PARTICIPATE



Source: Detailed Analysis.

Environmental Research Group  
 Georgia State University

### *Expenditures versus Benefits*

Based on survey data, nearly 9 million Southeastern households spent \$4.1 billion for wildlife oriented recreation during the study year. Households that both fished and hunted spent \$2.4 billion or 59 percent of the total \$4.1 billion expenditures. The second highest spenders were those who fished only, \$743.2 million, or 18 percent of all wildlife oriented expenditures. Those who enjoyed wildlife only for nonconsumptive use reported \$89 million, or 2.2 percent of the total.

A comparison of expenditures—actual outlays for one year by the population (with capital items amortized for one year)—with the monetary benefits received and required to give up, reveals that for every dollar of cash outlay, a total of \$5.90 benefits is received, and for every dollar placed on giving up activity, a total value of \$7.68 is received.

If the estimated \$50 million administrative expenditures for wildlife management in the Southeastern United States are compared with the \$24.2 billion monetary benefits to the users, the tax and the license dollar yields nearly \$500 in return benefits. If administrative expenses are compared with total value assigned to giving up participation, the administrative dollar yields \$630 in benefits.

### **Participation**

Southeastern United States wildlife participants reported for the year an average of 24.9 fishing days, 14.4 hunting days, and 118.3 days of wildlife enjoyment. For the nine sub-activities, days of participation ranged from a low of 8.9 days of waterfowl hunting to a high of 145.9 days of bird watching. The average number of days and occasions (30 minutes or more) devoted to wildlife activities for the year are shown in Table 4.

### **Channelization**

Channelization is the widening, deepening, and straightening of a natural stream or river, generally undertaken in the name of flood control or navigation. Watershed works of improvement are often sponsored by the Corps of Engineers and the Department of Agriculture, the latter through the Soil Conservation Service under the Small Watershed Program

In the Southeastern United States, the channelization aspects of these programs have been shown to be detrimental to fish and wildlife resources. The subject was included in the economic survey of wildlife resource demand to determine how knowledgeable the public is about the practice.

The interviewers of the randomly selected Southeastern households were deliberately not instructed, indoctrinated, or given hints as the nature of and effects of channelization. The results clearly indicate that the public does not understand it, either as a concept or as a practice. Of the sampled population, 80.8 percent never heard of channelization. Respondents who professed some knowledge (19.2 percent of the households interviewed) were questioned about the effects. From the inconsistent replies given, it is obvious that there is little knowledge on the subject. Another major finding on the channelization issue is that there exists a large, uncommitted, nonopinionated group among the public.



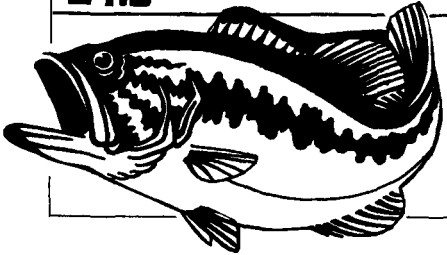
**TABLE 4**  
**AVERAGE NUMBER OF DAYS AND OCCASIONS**  
**PARTICIPATION IN WILDLIFE ACTIVITY**

		Days	Occasions
FISHING	Combined Average	24.9	31.5
	Saltwater:	16.2	20.5
	Warm freshwater:	29.0	36.7
	Cold freshwater:	21.3	27.1
HUNTING	Combined Average	14.4	17.2
	Small Game:	18.1	21.6
	Big Game:	9.4	11.2
	Waterfowl:	8.9	10.6
WILDLIFE ENJOYMENT	Combined Average	118.3	184.7
	Bird watching/photographing	145.9	225.8
	Animal watching/photographing	96.1	155.5
	Fish watching/photographing	45.1	63.4

**118.3**



**24.9**



**14.4**



## **Policy Implications**

- a. There is now a primary data-based set of monetary values available for resource planners at federal, state, and local levels for fish and wildlife project calculations.
- b. In the full spectrum of our national economic life, a set of monetary values is available for measuring appreciation of our wildlife resources.
- c. Nonconsumptive use of wildlife resources, so-called intangibles, has been shown to command monetary values.
- d. Results of this study indicate a need for a nationwide wildlife economic survey, especially since the Water Resources Council's Revised Simulated Prices per Recreation Day, published on Sept. 10, 1973, are quite different from the estimated values reported in the Southeastern economic evaluation.
- e. It is also evident that the administrative dollar put into the management of wildlife commands several hundred times more benefit to the users of wildlife.
- f. The physiographic regions in the Southeastern United States do reflect different levels of monetary values in accordance to the available supply of wildlife resources.
- g. Urbanized, concentrated population, and higher median income states have a different wildlife use pattern than that of states with less urban population, lower median income, and smaller cities.
- h. For the first time, Game and Fish departments in the Southeastern United States have a knowledge of the economic value of their wildlife resources and an analysis of the economic impact of these resources.
- i. Game and Fish departments can plan for license changes, fishing and hunting management areas, and other program development based on the wide spectrum of data presented in this economic survey. Although the major objective of the Survey was to determine monetary values of tangible and intangible wildlife resources, more than 40 other questions were also covered. Answers to these will place Game and Fish departments on a solid footing in their planning and program developments.

# Identifying Optimal Wildlife Resource Supply Quantities Which Maximize Public Use Benefits

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## **Introduction**

Wildlife administrators face a variety of uncertainties when appropriating budgets to provide public benefits. Specifically, the Colorado Division of Wildlife annually allocates in excess of ten million dollars to provide for protection and consumer use of the wildlife resource. In view of the size of this budget, it is desirable that administrators address their budget allocation decisions in a manner that is efficient and effective in providing public benefits.

The Division produces a range of outputs measured here in terms of recreation days. Recreation days, defined as opportunities for consumers to participate in a variety of wildlife related activities, are social goods. Government agencies assume the responsibility for providing such social goods for numerous reasons, not least of which is the fact that there exists no market by means of which the price system may act as the resource allocation mechanism. In the absence of an efficiently operating price mechanism, incentives for private provision of recreational products are obscured or eliminated. Thus, the public sector must make complex supply decisions in a world of uncertainty where values are implicit.

The theory and application of economics, however, can provide officials with supplementary information which may enhance sound budget allocation decisions. The approach adopted here basically involves restructuring methodology and models frequently used by private enterprise to fit public sector management. The purpose of this study is to determine the optimal supply of recreation days by product line which can be provided for public benefit by the Colorado Division of Wildlife.

## **Methodology**

Principles of optimization employed, identification of product lines, demand estimates and cost analysis are discussed below. The optimality model used here is the conventional "inventory" model under conditions of uncertain demand, where:

- $P_c$  = the cumulative probability that demand will equal or exceed a stated level.
- MB = the additional benefits derived from supplying another recreation day, an amount assumed to be constant and equal to the values of a recreation day by product line.
- MC = the additional costs of supplying another recreation day, an amount assumed to be constant and equal to the average cost of a recreation day by product line.

The assumption of constant and linear MB and MC is a simplification of reality, however, it is not an uncommon assumption when the application of economic models is attempted.

In the absence of budgetary constraints the optimum supply of recreation days is that quantity where:

$$P_c MB = (1 - P_c) MC.$$

The optimum quantity of recreation days is identified by the optimum  $P_c$  value:

$$P_c = \frac{MC}{MC + MB}$$

### *Selection of Product Lines*

Sixteen product lines (Deer, Elk, etc.) account for the greatest portion of the Division's budget and, consequently, are likely to be the focus of most decision making.

Certain key sport game species were assigned individual product lines while less demanded but related species were considered collectively. Fishing programs were not treated on a species-by-species basis. Rather, a product line distinction was made according to the type of fishing (stream, lake or warm-water). Finally, individual programs were aggregated into broad collective product lines to provide the basis for making optimal supply decisions at an aggregated level (e.g., sport game and sport fish).

The following is a complete listing of the 16 product lines and their corresponding numbers: (1) Deer; (2) Elk; (3) Other Big Game; (4) Ducks; (5) Geese; (6) Pheasants; (7) Doves; (8) Small Game Mammals; (9) Other Small Game Birds; (10) Archery Big Game; (11) Furbearers; (12) Coldwater Stream Fishing; (13) Coldwater Lake Fishing; (14) Warmwater Fishing; (15) All Sport Game Species; and (16) All Sport Fishing.

### *Recreation Day Computations*

Recreation days represent the only unit of measurement common to all product lines by which optimal supply decisions between individual product lines may be made. Recreation days are defined as the number of days, or

portions thereof, that a license holder uses his license for purposes of pursuing wildlife species. Nonconsumptive uses of wildlife (photography, viewing, etc.) are excluded by definition.

Several computational approaches to deriving recreation day figures for a given product line are possible and, in fact, were used for this study. For example, license sale figures, adjusted for the number of participants, may be multiplied by the average number of days each participant actually hunted or fished. Alternatively, the number of animals harvested may be multiplied by the average number of days required per kill. The latter approach was used for big game and the former on small game. Data for the three fishing product lines were obtained directly from the Division's Annual Creel Census Reports without any intermediate computations.

#### *Technique for Expressing the Value of Recreation Days in Dollars*

Economically optimal decision making requires that both production costs and product values be determined and expressed in a common denominator, namely dollars. The technique for valuation employed here is based on Bayesian decision theory which typically has been used only in the private sector (Bierman, Bonini and Hausman, 1969). In determining dollar values for recreation days by product line, the following procedures were used:

1. A set of possible values that a particular type of recreation day may assume were listed.
2. A probability of occurrence was assigned to each value.
3. A mean value was computed based on these probability estimates.

Empirical data for conducting the analysis were obtained by use of questionnaires completed by Division managers. Respondents were asked to assign a probability to each range of values for each type of recreation day. In doing so, they were requested to assume the role of a typical deer, elk or duck hunter. Clearly, such estimates are purely subjective measures of value even though respondents intuitively considered recreational expenditures, the opportunity cost of sacrificed income and the probability and value of success.

Using this technique, estimates of the dollar value of one recreation day for each product line were determined. Individual probability estimates were summed for each value range and divided by the number of responses to provide average probabilities for each value range. Multiplying the mid-point of each value range by its associated average probability provided a probable value contribution. The sum of these probable value contributions is an estimate of dollar value for one recreation day by product line. Values can also be estimated in this manner for an animal from each product line left "in the wild", or unharvested.

At first glance, it appeared that the values obtained via the Bayesian analysis were too high. For example, one deer hunting day was valued at more than \$93 and a day of fishing was valued at about \$19. However, a Colorado study by Nobe and Gilbert (1968) indicated that deer hunters (resident and nonresident combined) spent a total of \$41,069,290 and according to Division records, 526,529 deer hunting days were actually provided and "consumed." These figures suggest that each hunter spent an average of some \$78 per day of deer

hunting. Data obtained from the same sources indicated that the typical fisherman spent over \$25 per day of fishing. Thus, the Bayesian valuation results are reasonably close to the expenditure data obtained through costly survey methods.

### *Planning Projections to 1975*

In order to make the system developed in this study applicable in a planning context and for future supply decisions, it was necessary to investigate anticipated changes in recreation days demanded by product line. Analytical methods similar to those employed in the product line valuation phase of the study were used for this purpose.

A sample of Division administrators, planners and managers responded to a questionnaire and indicated to what extent they anticipated demand for each product line would change by 1975. All responses on all product lines were either zero or positive with the largest increase on any product line being 25 percent. With this maximum range as a guide, percentage increases in demanded number of recreation days were stratified into five categories, (0-5%, 6-10%, etc.). The number of responses given for each percentage range was recorded and the mean was calculated.

Using 1971 figures obtained from Division records as a base, the projected number of recreation days in 1975 was computed by multiplying the 1971 base figure by the average projected percentage increase. Thus, for each product line, an estimate was made for 1975 demand in terms of recreation days. Cumulative probabilities ( $P_c$  = probability that demand will equal or exceed a stated level) were estimated from the distribution of responses by percentage category.

### *Cost Estimation*

Estimation of costs associated with each product line required a technique for allocating the total Division expenditures among specific product lines. In the absence of any product-by-product budgeting and accounting system, Division staff were requested to supply their estimates of how total expenditures for the 1971-72 fiscal year budget were allocated. Administrators also completed this questionnaire and the responses were condensed into a single average percentage figure for each program. The results were used to compute average costs of producing a recreation day of each product line. These figures were assumed to include both fixed and variable costs.<sup>1</sup>

The questionnaires not only covered actual expenditure data for the 1971-72 fiscal year, but also requested an estimate as to how the Division's expenditures would be allocated in the 1975-76 fiscal year. Thus, knowing the projected total budget for 1975-76 and administrators' and managers' expectations for product line allocation of this future budget, product line costs for 1975-76 were computed.

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<sup>1</sup>In this analysis, fixed costs included: full time personnel services, contractual services, benefits, retirement and health insurance. Variable cost categories were: temporary personnel services, operating expenses, travel, capital outlay, special purposes and capital construction.

## **Analytical Results**

Application of the previously explained cost and value data to optimal supply models is summarized below. Probability theory continues to provide the basis for estimating optimal supply levels for each product line. In addition, break-even analysis is conducted for each product line as described in the following sections.

### *Break-Even Analysis, 1971*

Break-even analysis illustrates what happens to net benefits (the difference between total benefits and total costs) as the level of output of any given product line increases or decreases. The break-even point is where total costs exactly equal total benefits. Break-even analysis further shows what happens to net benefits at outputs greater or less than the break-even volume.

Table 1 shows the results of a comprehensive break-even analysis conducted for all product lines. From this table, in only one product line (Furbearers) is the Division providing a level of output below the break-even point. In all other product lines, the Division is operating considerably above the various break-even points and consequently is generating substantial net benefits.

In Table 2, net benefits are computed by subtracting total costs from total benefits at the actual level of production. In the case of the Deer Product Line, the break-even level of recreation day provision is 7,143 days. The Division Currently provides 260,364 deer recreation days thereby providing a surplus over the break-even level of 253,221 recreation days. Total benefits of 260,364 deer recreation days are valued at \$24,291,961 (each day is worth \$93.30) and total costs associated with providing these deer recreation days are \$1,635,007. Thus, the net benefits accruing from the Division's deer program amount to \$22,656,954. Adding together the net benefits of the Division's two composite product lines (All Sport Game and All Sport Fish) indicates total net benefits of over \$242 million were generated by a total budget expenditure of about \$11.5 million.

### *Break-Even Analysis, 1975*

A similar break-even analysis was conducted for each product line for the year 1975. In conducting this analysis, three assumptions were made:

1. Presently projected budget figures for the 1975-76 fiscal year would in fact be realized.
2. The value of a recreation day for any given product line would not change between 1971 and 1975.
3. The projected increase in the number of recreation days provided by the Division in 1975 would correspond to the results of another study conducted by the Division early in 1973.<sup>2</sup>

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<sup>2</sup>See internal Division study on recreation day projections to 1990 conducted by James Lipscomb and Lonnie Schroeder in January and February, 1973. This internal study was more detailed than the approach used to project recreation day requirements discussed on earlier pages of this report and therefore deemed to be more reliable.

**Table 1. Summary of a break-even analysis for each of the Division's product lines for the year 1971.**

Product Line	Total Fixed Cost	Recreation Day Dollar Value	Average Variable Cost	Break-Even Quantity (Days) <sup>1</sup>	Break-Even Cost (Dollars) <sup>2</sup>
1. Deer .....	639,099	93.30	3.83	7,143	666,457
2. Elk.....	617,061	266.00	4.74	2,362	628,257
3. Other Big Game .....	352,607	206.00	13.47	1,831	377,271
4. Ducks .....	154,265	23.10	.89	6,946	160,447
5. Geese.....	154,265	44.40	1.45	3,592	159,473
6. Pheasants .....	110,190	22.20	1.12	5,227	116,044
7. Doves .....	44,076	17.10	.68	2,684	45,901
8. Small Game Mammals.....	66,114	11.79	.82	6,027	71,056
9. Other Small Game Birds.....	66,114	23.50	1.57	3,015	70,848
10. Archery Game .....	110,189	91.00	2.91	1,251	113,829
11. Furbearers .....	66,114	19.90	35.33		
12. Coldwater Stream Fishing.....	590,699	19.38	.29	30,943	599,672
13. Coldwater Lake Fishing .....	1,408,589	18.11	.57	80,307	1,454,364
14. Warmwater Fishing .....	272,630	18.68	1.12	15,526	290,019
15. All Sport Game.....	2,380,094	78.69	2.37	31,186	2,454,005
16. All Sport Fish.....	2,271,918	18.68	.48	124,831	2,331,837

<sup>1</sup>Break-even quantity is total fixed cost divided by the difference between recreation day dollar value and average variable cost.

<sup>2</sup>Break-even dollars is total fixed cost plus the product of average variable cost and break-even quantity.



**Table 2. Summary of net benefits from each of the Division's product lines for the year 1971.**

Product Line	Actual Level of Production (Recreation Days)	Total Benefits Generated (Dollars)	Total Costs Incurred (Dollars)	Net Benefits (Dollars)
1. Deer .....	260,364	24,291,961	1,635,007	22,656,954
2. Elk.....	202,822	53,950,652	1,578,628	52,372,024
3. Other Big Game .....	40,797	8,404,182	902,074	7,502,108
4. Ducks .....	269,026	6,214,501	394,657	5,819,844
5. Geese .....	166,187	7,378,703	394,657	6,984,046
6. Pheasants .....	153,630	3,410,586	281,898	3,128,688
7. Doves .....	101,352	1,733,119	112,759	1,620,360
8. Small Game Mammals.....	125,000	1,473,750	169,139	1,304,611
9. Other Small Game Birds.....	65,425	1,537,488	169,139	1,368,349
10. Archery Game.....	59,098	5,377,918	281,897	5,096,021
11. Furbearers.....	2,916	58,028	169,139	-111,111
12. Coldwater Stream Fishing.....	3,190,643	61,834,661	1,517,544	60,317,117
13. Coldwater Lake Fishing .....	3,909,418	70,799,560	3,618,757	67,180,803
14. Warmwater Fishing.....	381,070	7,118,388	700,404	6,417,984
15. All Sport Game.....	1,446,617	113,830,888	5,637,958	108,192,930
16. All Sport Fish .....	7,481,131	139,752,609	5,836,705	133,915,904
Division Total <sup>1</sup>	8,927,748	253,583,497	11,474,663 <sup>2</sup>	242,108,834

<sup>1</sup>Division totals computed by summing product lines 15 and 16.

<sup>2</sup>This figure represents the Division's actual budget for 1971-72.

On the basis of these assumptions, net benefits generated by each product line were computed (Ashton, 1973). Adding together the net benefits of the All Sport Game and All Sport Fish Product Lines for the year 1975, total net benefits of over \$300 million could be realized by a total budget expenditure of about \$17.4 million.

#### *Individual Product Line Supply Optimization*

Economic optimality analysis, in the absence of any budget constraints, determines the level of recreation day supply on any product line to be at the point where:

$$P_c MB = (1 - P_c) MC$$

where  $P_c$  = cumulative probability that demand will equal or exceed a given supply level, MB denotes marginal benefits, and MC represents marginal costs.

Optimal supply conditions for each product line may be determined by plotting the two curves  $P_c MB$  and  $(1 - P_c) MC$  and reading off the number of recreation days at their point of intersection. Alternatively, the optimum cumulative probability (Optimum  $P_c$ ) may be computed mathematically from the following formula:

$$\text{Optimum } P_c = \frac{MC}{MC + MB}$$

For example, in the case of the Deer Product Line,

$$\begin{aligned} \text{1975 Optimum } P_c &= \frac{9.55^3}{9.55 + 93.30^4} \\ &= + .0928 \end{aligned}$$

In short, the Division should supply that quantity of deer days whereby there is at least a 90 percent probability that demand will not exceed supply.

Having obtained the 1975 Optimum  $P_c$  for each product line, it then becomes possible to compute the optimum supply level in terms of recreation days. The probability distribution derived from the surveys of projected demand discussed under *Planning Projections to 1975* is used to determine the level of demand associated with the Optimum  $P_c$ . This is the optimal supply level.

Table 3 presents the method of derivation and indicates the optimum level of production for 1975 together with the Division's own internally-derived projection for 1975. In the case of deer hunting, the 1975 optimum level of production is where both  $P_c MB$  and  $(1 - P_c) MC$  approximate \$8.50 and this

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<sup>3</sup>MC is derived by dividing the 1975 projected total cost (\$2,762,654) of the deer program by the 1975 projected level of recreation days (289,264).

<sup>4</sup>MB is the value of one deer hunting day estimated by the procedure described earlier.

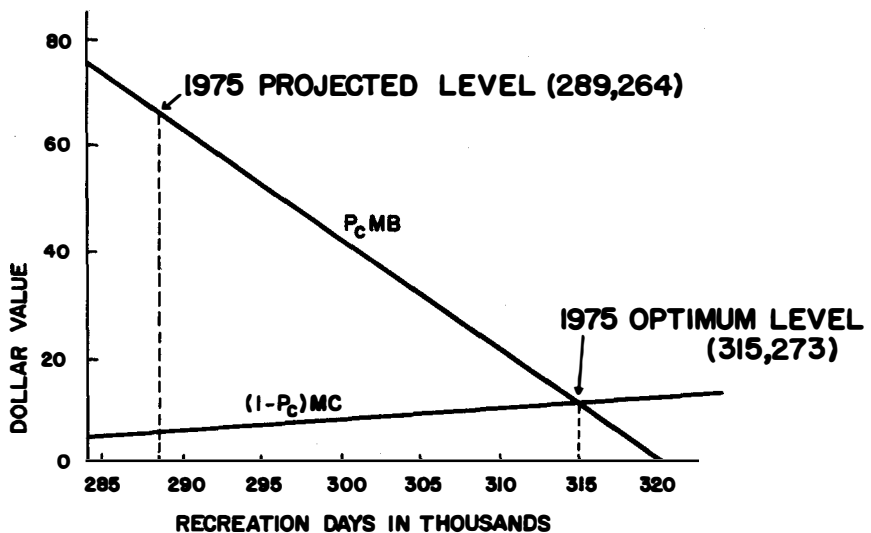
**Table 3. Example of derivation of  $P_c$ MB and  $(1-P_c)$ MC values for the Deer Product Line.**

Quantity of Recreation Days	$P_{cum}$	$1-P_{cum}$	$P_c$ MB	$(1-P_c)$ MC	Comments
286,182	.75	.25	69.97	2.39	
289,264	.67	.33	62.51	3.15	1975 Projected
292,909	.58	.42	54.11	4.01	
309,052	.25	.75	23.32	7.16	
315,273	.09	.91	8.40	8.69	1975 Optimum
318,946	.00	1.00	.00	9.55	

condition occurs at an output of 315,273 deer hunting recreation days. The Division is actually projecting a 1975 supply of 289,264 deer hunting recreation days which is somewhat less than the economically optimal position. The implication therefore is that the Division should expand its Deer Product Line at a rate greater than that currently projected so that the optimum position for 1975 may be reached or at least closely approximated.

The same information relating to the Deer Product Line is presented graphically in Figure 1. The discrepancy between the Division's 1975 projection and the economically optimal becomes clear from this illustration.

A summary of data showing comparisons of 1971 supply, 1975 optimal supply and 1975 projected supply positions for each product line is presented in Table 4. Comparing the optimal supply position with the projected 1975



**FIG.1 PROJECTED AND OPTIMUM LEVELS OF OPERATION IN 1975 FOR THE DEER PRODUCT LINE.**

**Table 4. Summary of 1971 actual supply, 1975 optimal and projected supplies with recommendations for optimal allocation of the 1975-76 budget.**

Product Line	Supply Positions for Each Product Line for 1971 and 1975			Recommended Action for 1975	Optimal Allocation of 1975-76 Budget	
	1971 Actual	1975 Optimal	1975 Projection		Dollar Share of Budget	Percent Share of Budget
1. Deer.....	260,364	315,273	289,264	expand	2,758,250	15.8
2. Elk.....	202,822	256,164	224,726	expand	2,529,650	14.5
3. Other Big Game.....	40,797	47,448	45,203	expand	1,006,476	5.8
4. Ducks.....	269,026	315,845	296,467	expand	783,680	4.5
5. Geese.....	166,187	199,350	182,972	expand	802,776	4.6
6. Pheasants.....	153,630	176,111	170,222	expand	572,000	3.3
7. Doves.....	101,352	116,890	112,197	expand	191,552	1.1
8. Small Game Mammals.....	125,000	141,180	138,375	expand	282,500	1.6
9. Other Small Game Birds.....	65,425	72,194	72,360	contract	366,989	2.1
10. Archery Game.....	59,098	71,040	65,599	expand	698,913	4.0
11. Furbearers.....	2,916	3,017	3,240	contract	257,089	1.5
12. Coldwater Stream Fishing.....	3,190,643	4,003,351	3,989,916	expand	2,308,475	13.3
13. Coldwater Lake Fishing.....	3,909,418	4,932,219	5,707,750	contract	3,893,300	22.4
14. Warmwater Fishing.....	381,070	468,124	556,362	contract	959,400	5.5
15. All Sport Game.....	1,446,617	1,714,512	1,600,625	expand	10,249,875	58.9
16. All Sport Fish.....	7,481,131	9,403,694	10,254,028	contract	7,161,175	41.1
Division Total.....	8,927,748	11,118,206	11,854,653		17,411,050	100.0

supply position for each product line, it can be observed which product lines should be expanded or contracted for 1975.

The Division's projected total number of recreation days to be provided in 1975 is slightly excessive when compared with economically optimal conditions. This is due primarily to the over-projections on the two fishing product lines (numbers 13 and 14) and the resultant over-projection on All Sport Fish Product Line (number 16).

### *1975-1976 Budget Allocation*

If each of the product lines considered are to be operated at their respective optimal levels in 1975, a total budget of about \$17.4 million will be required. The Division is projecting a budget of \$17,359,700 for the fiscal year 1975-76 which is not significantly different from the budget required to optimize each product line. Thus, assuming this budget of \$17.4 million is forthcoming in 1975-76, it will be possible for the Division to achieve economically optimal levels of production on each of its major product lines. Table 4 depicts the actual dollar amounts and the percentage shares of the projected 1975-76 budget that should be allocated to each product line.

In moving toward the optimum budget allocation for 1975, the ratios of  $P_e MB / (1 - P_e) MC$  reveal the added net benefits gained by spending another dollar for each product line. Thus, the information in Table 5 reveals that the expenditure of \$1 on the Deer Product Line beyond the 1975 projected level generates \$20.2 in net benefits, a rate of payoff which will gradually decline until 315,273 recreation days are supplied. At this optimum level, added benefits are \$1 for each \$1 in additional costs. In contrast, the expenditure of \$1 more on pheasants beyond the 1975 projected level of 170,222 recreation days generates a smaller incremental benefit gain of \$1.8 and once again approaches the ratio of \$1 benefits per \$1 costs as the optimum number of recreation days (176,111) is supplied.

Net benefit payoff garnered from expanding output beyond projected 1975 levels is substantial for several product lines (generally in the game area), whereas negative or unfavorable payoffs are generally associated with expansion of fishing beyond the 1975 levels. The Division can most "profitably" serve the public interest by expanding the production of recreation days in those product lines where the probable MB/MC ratio is the greatest at each future level of budget expenditure ranging from the \$11.5 million in 1971 up to the 1975 level of \$17.4 million. Initially, priorities should be placed upon elk, geese, archery game, deer, and ducks.

### **Summary and Conclusions**

The foregoing analysis of cost and output relationships for wildlife recreation depicts optimal supply under conditions of uncertainty. Great controversy has prevailed for some in the past concerning the use of Bayesian decision theory procedures. The purpose here has been neither to defend nor critique the use of this methodology, and the reader should recognize, as the authors do, the limitations of the methodology. All such limitations aside, however, one fact is clear: year after year public sector administrators make supply and resource allocation decisions and more often than not these decisions are made

**Table 5. Ratios of probable MB/MC based on the Division's 1975 projections of recreation days by product line.**

Product Line	Recreation Days (000)			Probable Marginal Benefits (Dollars)	Probable Marginal Costs (Dollars)	Probable MB/MC Ratios
	1971 Actual	1975 Projection	1975 Optimum			
1. Deer.....	260.4	289.3	315.3	62.5 <sup>1</sup>	3.1 <sup>1</sup>	20.2
2. Elk .....	202.8	224.7	256.2	209.6	2.3	91.1
3. Other Big Game.....	40.8	45.2	47.4	76.2	16.7	4.6
4. Ducks.....	269.0	296.5	315.8	14.8	0.9	16.4
5. Geese .....	166.2	183.0	199.4	34.9	0.9	38.8
6. Pheasants.....	153.6	170.2	176.1	4.6	2.6	1.8
7. Doves.....	101.4	112.2	116.9	4.8	1.2	4.0
8. Small Game Mammals .....	125.0	138.4	141.2	2.7	1.6	1.7
9. Other Small Game Birds.....	65.4	72.4	72.2	3.3	4.4	0.8
10. Archery Game.....	59.1	65.6	71.0	67.0	2.6	25.8
11. Furbearers .....	2.9	3.2	3.0	1.6	78.6	0.0
12. Coldwater Stream Fishing .....	3,190.6	3,989.9	4,003.4	0.9	0.6	1.5
13. Coldwater Lake Fishing .....	3,909.4	5,707.8	4,932.2	0.8	1.3	0.6
14. Warmwater Fishing.....	381.1	554.4	468.1	1.8	3.1	0.6

<sup>1</sup>P<sub>c</sub>MB and (1-P<sub>c</sub>)MC at the projected 1975 supply level (see Table 3).

on the basis of little or no cost and product line data. The above may or may not improve upon the present "flying by the seat of the pants" syndrome, but at least it is our position that such data and analysis as are described above are not detrimental, and there is some chance that they are beneficial.

In conclusion, analysis of cost and benefit values reveals that Division expenditures of \$11.5 million produced 8.9 million recreation days and generated an estimated \$253.6 million in total benefits. The optimal level of Division output in 1975, some 11.1 million recreation days at an average cost of about \$1.50 per day, is expected to generate probable total benefits valued at \$317.4 million.

Break-even analysis indicates that all product lines except Furbearers are generating net benefits above fixed and variable costs.

The ratio of probable marginal benefits  $P_cMB$  to probable marginal cost  $(1-P_c)MC$  reveals additional net benefits or "payoff" associated with increasing expenditures from the 1971 level (\$11.5 million) to the projected 1975 level (\$17.4 million).

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# Wildlife Priorities and Benefits: Now, 2000, and Beyond.

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## Introduction

We are hurtling into the future. On one hand, somewhat like the comet Kohoutek, wildlife management's future prospects and directions are determined by its ties to the past—we are tied to old institutions, old ways of doing things, and most of all, old ideas. On the other hand, as we emerge from the past, our path in wildlife management can be altered by the gravitational tugs of larger systems—and today's ecology and power crises seem to accelerate our momentum toward an unclear future. In the process, our ability to orient wildlife's needs to national goals and priorities seems, at times, to be chaotic. The needs and demands of the future are changing faster than we can cope with them. The result is rupture and dislocation of public concerns for wildlife priorities and benefits—and we begin to experience what Toffler (1970) calls "future shock."

Our inquiry in this paper is designed to anticipate such shock; to open rather than close questions about where wildlife management is today and where it is headed; and to pose relevant challenges rather than provide definite answers to the questions of wildlife priorities and benefits—now, in the year 2000, and beyond.

## Today's Wildlife Priorities and Benefits

*A Survey of Recreation Planner's Decisions*

Several years ago a forecasting technique called PATTERN (Planning Assistance Through Technical Evaluation of Relevance Numbers) was developed to help corporate decision makers evaluate their decision-making priorities (Esch 1969). The PATTERN methodology involves having decision makers assign quantitative values to various factors that affect a decision—in terms of the percentage of impact each factor has on the final decision. Saying it another way, results from the PATTERN study indicate (in terms of a percentage value) the importance of certain favors in a specified decision.

The PATTERN approach was used recently in a personal interview survey to determine the priority that recreation planners assign to wildlife values in comparison to the values they assign to other physical features of the resource and to social needs and conditions associated with the development of recreation facilities. The survey results indicate how planners perceive wildlife values in relation to a wide range of other considerations that are involved in the development of recreation environments. The reported wildlife priority values



also reflect the planner's perception of wildlife societal benefits through several decisions involving a range of social constraints and recreation environments.

#### *Types of Decisions and Decision Makers Involved*

We interviewed a total of 47 decision makers in four public agencies about three decision situations. Each decision involved three distinct types of recreation environments:

1. Development of a typical 30-acre day-use recreation area in an urban environment
2. Development of a typical 400-acre day-use recreation and overnight-use (camping) area in a rural forested environment
3. Development of a typical 20,000-acre wildland recreation area with facilities such as hiking trails and canoe routes

Planners were asked to consider the *typical* situation and not to confine their responses to a particularly unique or unusual development problem.

The interviewed decision makers were on the staffs of the chief executives of the following agencies: Bureau of Outdoor Recreation, New York State Office of Planning Coordination, Pennsylvania Bureau of State Parks, and the U. S. Forest Service.

#### *Social Considerations*

Planners were asked to consider the following nine social factors in each of the three decisions:

1. Present demand patterns for the recreation environment
2. Amenity values associated with the environment
3. Pressure from recreation-oriented groups to develop the environment as specified in the decision
4. Compatibility of the environment with nonrecreation uses
5. Interagency coordination concerning the recreation planning and development process
6. Political influences
7. Money available for planning and development
8. Technological advances that might change use patterns of the planned recreation environment
9. Impact of the recreation development on regional and local economic conditions

#### *Environmental Considerations*

Also, for each of the three decision situations, respondents were asked to consider the following physical attributes of the recreation environment to be developed:

1. Acreage (An average acreage was specified for each decision, and respondents were requested to restrict their evaluation of this factor to that average value.)
2. The physical distance of the recreation area from population centers
3. Ease of access afforded by transportation systems to the area

4. Existing and potential water-recreation resource opportunities
5. Existing man-made structures in the area to be developed
6. Topography of the area
7. Diversity, amount, and distribution of natural vegetation
8. Number and variety of fish and wildlife that are present, or could be introduced
9. The overall rarity value or uniqueness of the total resource, before and after it is developed or preserved

#### *A Decision Chessboard with Social and Environmental Coordinates*

The interview questionnaire form for each of the three decision situations resembled a chessboard with 81 squares. The coordinate location of each square was defined in reference to the two dimensions of the board—nine social by nine environmental considerations.

Respondents entered a percentage value (from 0 to 100) in each square on the basis of the proportion (if any) of the total decision that was effected by the interrelationship of a square's coordinate descriptions. The sum of all entries for an 81-square decision matrix had to equal 100 percent.

Surprisingly, respondents in the different agencies who were surveyed had very similar response patterns for each of the three decisions. Therefore, an average decision matrix was developed for each decision. To facilitate interpretation of the data, percentage values in each average matrix were labeled *high*, *medium*, *low*, or *negligible* in priority, according to their quartile value within the matrix. This procedure identified the interacting social and environmental coordinates of the chessboard where the high, medium, low and negligible priorities occurred in some of today's important decisions that affect wildlife values and benefits.

This paper discusses only those priority values associated with the intersections of the wildlife coordinate as it crosses the nine social factor coordinates in the three average decision matrixes. Remember that any one priority rating always is in relation to the other 80 squares in the decision matrix.

#### *Recreation Demand and Amenity Values*

In the development of wildland environments (as outlined in the third decision situation), decision makers assign a *high* priority rating to wildlife values as such values relate to recreation demand for wildland environments and associated wildland amenity values.

In planning to meet recreation demands and to provide amenity values in picnic and camping areas near metropolitan areas (as discussed in decision number two), decision makers give wildlife values a *medium* priority rating.

However, in the development of city recreation areas (decision one), wildlife values are of little concern (*negligible* priority) to planners in their attempts to satisfy demand for amenity values.

The ability of organized pressure groups to retain and improve wildlife values in wildland recreation environments is given *high* priority in the management planning of these lands. On the other hand, in rural and urban

recreation planning, any pressure group activity aimed at benefiting wildlife has a relatively *low* impact on the ultimate development decisions.

#### *Interagency Coordination, Political Influences, Non-Recreation Uses*

Again, in wildland recreation planning, wildlife values are important considerations (*medium* priority rating) insofar as they affect interagency coordination, are affected by political influences, and are compatible with nonrecreation uses. But the interrelation of wildlife values with these same sociopolitical forces and nonrecreation uses of the resource are rated *low* or *negligible* considerations in rural and urban recreation planning procedures.

#### *Money, Technology, and Economic Considerations*

According to the planners interviewed, money available for planning and development of wildland, rural, or urban recreation environments has very little to do with any wildlife values that may be present or likely to be developed. Also, in all these decision situations, *low* or *negligible* priority ratings were assigned to the interrelationship of wildlife and economic opportunities or technological advances in recreational equipment and environmental control.

### **The City Is the Frontier**

#### *Wildlife Priorities—Low or Negligible in the City*

Notice that in the survey of planners, wildlife values rate high in the recreation environment planning process only for *wildland* management situations—areas where wildlife is prominent already, or where it will most likely occur. And only occasionally, wildlife is given a *medium* priority rating in rural recreation planning. In the city, wildlife values never rate more than *low* or *negligible* in priority.

If we continue to place heavy emphasis on wildlife values only where wildlife presently exists in abundance, will the eight out of ten Americans who will be living in cities by 1980 become less concerned with wildlife—as well as with policies and programs designed to maintain, perpetuate, and protect wildlife?

#### *The Emerging Challenge*

The wildland, rural, and metropolitan planning decision situations discussed thus far do not include some of the more classical game management planning situations that we may feel more comfortable with. The three decisions, on the other hand, involve interactions of people and wildlife—not hunters and deer, or fish and fishermen, but interactions of all kinds of people with all kinds of wildlife.

“Recreational development,” Leopold (1966) said “is a job not of building roads into lovely country, but of building receptivity (of the joys of nature) into the still unlovely human mind.”

Why then, as concerned environmentalists, haven’t wildlife specialists (managers, educators, researchers) moved more aggressively into the fertile problem area we sometimes call urban wildlife; why don’t they work with planners,

landscape architects, politicians, economists, and others in “building receptivity of the joys of nature” into the minds of metropolitan populations?

We certainly have the necessary expertise. Abrams (1965), for example, pointed out that before Cleveland zoo designers drew a single line on paper they devoted considerable research to animal habits and the values of natural sites. Similar studies on the need for natural environments and wildlife values in human developments are rare.

Perhaps, as Dubos (1968) suggests “. . . most human problems have such complex historical and social determinants that they do not lend themselves readily to tidy planning or to study by the methods of the natural sciences.” Notice that Dubos does not imply that the problem should not be tackled; rather, what is needed is a change in some of our old ways of doing things.

### *Are We Tied to the Past?*

So why do we in wildlife management continue to wait until the waves of “future shock” (Toffler 1970)—caused by environmental degradation of natural wildlife habitats within our city boundaries—engulf and overwhelm us with insoluble problems?

Something apparently is happening in the wildlife profession to hold off decisions to meet the shock wave of urban wildlife problems—until it builds sufficient pressure to burst on the scene with shattering force. Hunter (1969) postulates that this “something” in most agencies and organizations “. . . is a series of suppression techniques which are employed (frequently unconsciously) by designers and managers of *new* programs.” That is, the decision makers and researchers who have successfully solved the problems of the last shock wave are sometimes the least likely to successfully predict and solve a series of new problems, because most of these people will spend several years defending their most recent decision or research finding. Ironically, it is during this period that they have the highest reputation as advanced thinkers.

So what should we do about it?

Force decision makers to focus on the next most important shock wave that will likely arise (urban wildlife preservation and protection being only one of them) before the hottest solution to the last problem has had time to cool off. Decision makers who want to spend time creating an inner circle of followers to worship their last problem-solving technique should be relieved of their decision-making role—and that may be the toughest decision of all.

## **Some Future Shock Waves**

### *Need to Change Priorities May Increase Conflicts*

Not only do we face the problem of how to define urban wildlife management goals in a pluralistic, democratic setting, but we need to find out how to bring about the degree of institutional change that we suspect wildlife values and man’s future environments call for.

The answer is not “blowin’ in the wind”; we will not find the answer on a magical tour of some rock group; the answer will not come to us with the dawning of the Age of Aquarius. Indeed, if we rely on the presumed panacea of such approaches, we shall more likely experience the groaning rather than

the greening of America. The developing tensions of our society cannot wait that long.

We must work with speed and competence to build into our institutional systems the possibilities for a fuller expression of wildlife values—particularly in urban environments. The task of changing some of our old priorities and practices in wildlife management is for the tough-minded and competent. Those who come to the task with the currently fashionable mixture of *passion* and *incompetence* only add to the confusion.

#### *What Does the Future Hold?*

Looking toward the future, we can provide direction and scope to evolving policies that aim for a harmonious future relationship between man and wildlife resources. But the future must be specified and obstacles along the way delineated so that a desirable course can be charted.

In a mailed survey of 400 imaginative people who are responsible for making today's environmental planning and management decisions, we probed for probable events that may influence wildlife management in the future. The research strategy used was the DELPHI technique (Helmer 1966). The technique derives its importance from the realization that projections of future events, on which today's policy decisions must rely, are largely based on the personal insight of informed individuals—rather than on predictions derived from well-established current theory.

Some of the events predicted by our panel are summarized from the following perspectives: those of the hunter, the wildlife and resource manager, and society as a whole.

#### *The Hunter*

The hunter of the future will pay more for his license, but this will not necessarily guarantee him a hunting opportunity. Decreasing land available for hunting and changing social attitudes toward hunting will curtail his hunting freedom.

By 2000, anyone wishing to shoot game will need to be certified as a hunter before he can purchase a license. Once certified, he will have to pay a high fee for his license and obtain a permit to hunt on public land. Land areas in public ownership will be operated on a hunting permit system. Farther into the future, sometime around 2020, only public land specifically managed for wildlife will be available to the hunter.

By 2000, the hunter will not be allowed to use a motorized vehicle of any kind when hunting in a designated hunting area. Game laws will be strictly enforced, and penalties for violations increased. In fact, by 2025, at least half of the states will permanently revoke licenses of fish and game law violators.

#### *The Wildlife and Resource Manager*

Technology will provide useful tools for the wildlife manager of 2000. Captive rearing will be used to raise rare and endangered species for release into the wild. Wildlife migrations will be monitored from space by satellite. Sometime after 2050, wildlife populations will be managed by birth control rather than by hunting, trapping, or poisoning.

Dwindling resources will result in attempts to increase the amount of land available for hunting. Controls will be placed on the amount and kind of hunting permitted on existing areas. By 1980, government economic incentives will be available to private land owners who open their land to public recreation use, including hunting.

By 1990, growing hunting pressure will require that limits be placed on the number of hunters allowed to hunt on a particular land area. About 2000, a national land use zoning policy will be established that places additional constraints on where hunting will be permitted. Permits will be required to control the distribution of hunting on all public land. At the same time, all land resources—including marine and estuarine areas—will be under intensive management for wildlife production. Although public planning and control of hunting activity will increase, private landowners will retain primary control over hunting activity on their properties.

### *Society and its Attitudes*

Although hunting will continue for some time into the future as an important use of wildlife resources, by the year 2000 non-consumptive uses of wildlife—such as photography and observation—will be the primary social values. The shrinking acreage of land resources available for people-wildlife interaction, particularly near urban areas, will require that cemeteries and other open space in urban areas be managed intensively for wildlife habitat and for observation of wildlife.

The prevailing mood of our panel was one of excited optimism; but at the same time, the panel perceived major changes in current attitudes toward wildlife benefits. If results of past predictions of man's progress are any indication, then in all probability most of the events will occur sooner than expected. Consequently, conventional attitudes toward present planning priorities for wildlife values need to be changed—and the sooner the better.

"Enough talk, enough projection about the future," you may say. But have we had enough of either thought or communication in the real sense? Haven't we been talking *at* each other rather than *with* each other? Hasn't our thinking been the reinforcement of comfortable, time-worn beliefs—often outdated, irrelevant ideas—rather than the mind-probing and soul-searching we need?

### **Wed the White Queen to Tiresias**

Debating future wildlife management philosophy requires that we wed the mythical abilities of the White Queen and Tiresias.

Tiresias, the son of a nymph in Greek mythology, could see the future in its totality in a single flash of comprehension. Conversely, the White Queen in Lewis Carroll's "Through the Looking Glass" lived backward through time. For example, the Queen began to cry before she stuck herself with her brooch, and stopped immediately afterwards. The "... one great advantage (to living backwards in time)," said the Queen "... is that one's memory works both ways . . . it's a poor memory that works only backward."

The Queen's approach treats the future as a gradual unfolding of contingent probabilities (with one event following another); while Tiresias' vision indiscriminately reaches into the future. If wildlife management is to help mold

present and future man-environment relationships, then we need to cultivate the White Queen's memory while, at the same time, comprehending the future as Tiresias did.

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## Panel Discussion

DISCUSSION LEADER DRIVER: Before we go to open discussion I would like to try to tie together some of the pervasive threads that have been woven through the different papers.

The first thing that was presented quite a few times, is that values will continue to change with respect to the nonconsumptive uses of wildlife. Dale Shaw made a point of this in his paper.

A second theme that I saw in the seven papers was existence of some anti-hunting sentiment. I don't know whether it is significant or insignificant. Linder and his associates found, as a specific case, that about two-thirds of South Dakota residents opposed dove hunting. Dale Shaw found anti-hunting sentiment in his study. It was not strong but there was at least some.

Linder and his friends found that the South Dakota residents who would vote against dove hunting and who would be willing to encourage others to do so had held the strongest attitudes with respect to the statement that hunters are persons who just like to kill animals. I think this reflects some anti-hunter attitudes. Also, Tom Brown found that—although there was no widespread anti-hunting sentiment—about 89 percent of landowners in New York had experienced at least one bad experience with hunters. If 89 percent said they had a bad experience, there is certainly a basis of concern.

Another thread running through all these papers was that the changing values with respect to wildlife are related to the relative scarcity of the resources. A point was made, for example, that our resources and habitats are becoming scarcer. Mr. Kitts pointed out that over a million acres per year are being removed from agricultural and related wildlife uses. This indicates that we will continue to have increased relative scarcity.

Moeller and Shafer pointed out that in 48 regional areas they studied, wildlife was not given a high priority in the land planning decisions except in those environments in which wildlife was likely to occur. On the one hand, we see increasing relative scarcity with respect to habitat and, on the other hand, land managers not giving wildlife as much attention in highly developed areas as they are in the areas where wildlife is relatively abundant. Therefore, we have a compounding effect of relative scarcity.

This relative scarcity was related to attitudes in several papers relating to attitudes. Brown, for example, found that New York landowners with urban backgrounds registered stronger anti-hunting sentiments than did rural landowners. Dale Shaw pointed out that anti-hunting sentiment was strongest in college students from urban areas, and he found a nice correlation. Horvath suggested that people from urban areas place a higher value on wildlife than people from rural areas. Therefore, a pervasive theme is that there is relative scarcity of wildlife in relation to urban areas.

We had some discussion of different techniques that are being used to define and measure wildlife related values. For example, Horvath reported on ways to identify and measure values of fishing and hunting and wildlife enjoyment. Shafer and Moeller discussed the application of techniques, such as Pattern and Delphi, which can be

employed to help register and quantify some of these subjective judgments of resource managers regarding wildlife. The authors have studies suggesting that values derived from wildlife uses might be considerably under-estimated in our conventional techniques for environmental impact appraisals or cost analyses.

With regard to all of these papers, there are several conclusions which can be drawn and recommendations made.

First, that the attitudes and values toward wildlife are going to continue to change with nonconsumptive uses being of increased relative importance.

A second conclusion is that the hunters themselves need to police their own fraternity. We should shoot for better images.

Third, we need more adaptive wildlife management policies and programs on the part of wildlife management agencies. Bill Shaw pointed out the need to seek alternative sources of funds to supplement the more traditional funds related to consumptive use, such as Pittman-Robertson and license fees.

Fourth, it was also pointed out that we need, in wildlife management, to change the skill mix, in terms of expertise, in wildlife management.

Lastly, a suggestion was made that we need to try better to keep up with the rapidly changing future.

These are some of the pervasive things that I got from the papers. We will now open it up for questions from the audience.

DELEGATE [Hawaii]: I anticipate in the years ahead there will be a significant push for the reestablishment or encouragement of predators to re-establish biological controls on some of our wildlife and a parallel push for removal of exotic wildlife. On this basis, do you foresee here a correct analysis of the situation?

DISCUSSION LEADER DRIVER: If I understand your question correctly, you are asking whether there will be increased movement toward biological controls of wildlife?

DELEGATE [Hawaii]: A natural, biological control.

MR. ED PRENZLOW: I can only speak for Colorado, where we have a great amount of requests coming in to restore animals such as the wolverine, the grizzly bear, all predators of some type, into the ecosystems in Colorado.

MR. BOB LAHM [Corps of Engineers]: I have a question for Mr. Horvath.

You mentioned that the survey included some analysis of actual expenditures for recreation. The entire gist of the report deals with values of wildlife, for pleasure and for income. Now, what would you take for a day of fishing? Here I refer to the cost. You also state that the value for a given type of thing is a good way to analyze wildlife values. Therefore, I wondered why you felt that way as opposed to perhaps the actual expenditure type of information.

MR. HORVATH: There was just not enough time to present that information. For example, there are some 290 different tabulations and cross-tabulations in the final publication. This is a detailed summary and will be coming off of the presses this month. If anybody wants a set, we will mail you this information for a small charge.

The wildlife recreation expenditures were collected and we have the data and it is presented here. The total amount is about \$4.1 billion from the same southeastern population. For every amount of dollar expenditure, about five to six dollars of monetary benefit is received. This is well documented in the detailed summary.

The second question is why the monetary value required was brought in. In this respect, let me say that the monetary benefits received were always lower than the monetary benefits required to give up that day. We feel that if you had a good day of fishing, a good benefit for you, then it was, let us say, \$50.00. However, if you required sixty or seventy dollars to give up that day, then the first value was a very solid and good figure we could work with.

MR. LAHM: Do you feel that people, such as the Office of Management and Budget, and the people dealing with water resource planning under the new standards and principles will accept these types of economic evaluations?

MR. HORVATH: They are very much looking for such information. We believe that, in relation to both documents, they do involve primary data. I believe this data is important. Further, it was presented in such a way that we can go even to the Supreme Court in backing up the data. I believe that even they could use it—not only they, but the whole legal spectrum, down to the Corps of Engineers, the Soil Conservation Service, the



Fish and Game Service, the Bureau of Sport Fisheries and Wildlife, etc. We believe that all of these data, in the final analysis, will be useful in connection with some form of resource planning.

MR. RICHARD WALSH [Colorado State University]: My questions are for Mr. Horvath and Ed Prenzlów.

In your preliminary report, Joe, you report that the average willingness to pay additional license fees for improved fishing came to \$1.65 per day for the fisherman. Now, how do you relate that finding to your finding that the value received per fisherman was \$43.00 per day and the value required to give up a fishing day was estimated at \$52 per day? It is a very long way from \$52 per day to \$1.65.

MR. HORVATH: We do not control the primary data. The respondents have given us the data and we, in turn, have only compared and presented it.

Of course, there are things such as people paying only ten dollars for one day of fishing and they have put down that they have received either fifty dollars or one hundred dollars of benefit. In the final analysis, it is up to that person to tell us.

Of course, there are questions like this to consider and I believe that when you are dealing with ten thousand people, they do involve a normal curve and there are also extremes at either end. Now, as to the data, we have merely accepted it and worked it out on this basis.

MR. WALSH: My next question is to Ed Prenzlów. In listening to the earlier talks, I could not help but relate them to your talk later on. Here I refer to the problem of landowner posting and the anti-hunter scene.

In your costs of some ten million dollars a year as the total cost of providing wildlife hunting and fishing in Colorado, it seems to me that you may have left out a few costs that are incurred by the landowner and that may involve two problems that need to be related. Therefore, on this basis, I am wondering how you feel about the possibility of including in the total cost of hunting and fishing and other wildlife related activities the cost to the landowner as well as to the game and fish department?

MR. PRENZLOW: There are different needs to include that cost, and it involves much cooperation. I also think that we have to listen to all the publics, not just the primary public, the sportsmen or the nonconsumptive users. We have to go out and negotiate with these people, understand what the problems are, and see if there is some way that they can be compensated for the cost. There are many other ways than giving them money by which we can do this and, of course, you are correct, these are legitimate costs that should be covered.

MR. JOHN KRUTILLA [Virginia]: I have a question for Mr. Horvath.

In your statement you suggested that the benefit measures for wildlife that you had obtained were reckoned in the same metric as values of other resources. When you came to requesting information on what the value of this service was, there were two ways of asking the question. In other words, depending on the way you ask it, it will give you different results.

One way would be as you did—what would the respondents have to receive in compensation as an average daily fee to compensate them for giving up their recreational resorts. Alternatively, you could also ask what he would pay to assure himself of the opportunity for this recreation today.

Normally, the answers are going to be substantially different and the reason is, in the first instance, the amount that you would receive is not constrained by his income. On the other hand, the second form of question relates to what in fact he is able to pay.

Now, since you do get different results, I wonder why you rationalized the formulating questions the way you did because, as I say, any way you ask the question, there could have been different types of value from the manner in which you chose to ask that question.

MR. HORVATH: Thank you. I believe your question is valid. We did not, however, ask that fourth or fifth question—how much they would be willing to pay to do these things. We asked pertaining to the expenditures and willingness to travel and all the other questions but we did not ask that particular one.

However, interestingly enough, when we compare the annual income with the monetary benefits received—the monetary benefits required to give up participation, they correlate beautifully with the total income. In a very few instances, the people who made

less than seven thousand dollars a year, said that their value of bird watching was \$500 or so. They generally tended, however, to be very much closer to their usual expenditures. However, I cannot give you a reason.

The interesting thing to note, here, is that all the states were visited and we spent time with them and, of course, with many people, we tried to revise and get the best possible set of questions. Now, as to the question of how much one would be willing to pay to actually do this, we left that out and, for that, I am sorry.

STUDENT [University of New Mexico Law School]: I have a comment to follow up upon the last question and that is that I am amazed that almost identical questions are asked in the tort claim area—the question of ability to pay on the one part and then how much is something worth to a person.

For example, there will be an automobile accident in which someone loses a limb. Obviously, he had limited ability in relation to payment for this limb ahead of the accident. In this connection, in one case, one of the greatest tort lawyers asked a jury how much they would take were they to lose a limb and he got some fantastically high figures—as high as a million dollars—something that a person could not possibly have paid based on his income. Now, I don't think this is a perfect analogy but I would suggest there are answers involved in the institutions that we have constructed to handle these types of problems and that might also be worth pursuing.

Basically, in relation to this matter of the way the questions were asked, whether one is able or willing to pay as against what he will take for compensation, it relates to the investment of property rights. For example, in the area where the resources are privately owned, on private lands, you should ask how much would be paid for a day of recreation. However, if you are talking about common or public lands, with common access, then it is not clear which of these two questions should be asked. I think it has to go to the courts for decision. It is essentially a question that is in the equities and some courts have not as yet spoken to this.

I direct this question to Dale Shaw.

I believe, Mr. Shaw, that one of the recommendations in your thesis is that the courts should be tough and, therefore, I would like to have that clarified. In other words, would you be more specific as to what you mean by "tough," and how does this fit into the general system of, say, court procedure in sentencing?

MR. DALE SHAW: When a game law violator or trespasser is apprehended by a wildlife conservation agent, usually it is a local Justice of the Peace to whom this violator is sent. He is very often taken to this type of individual to be tried. It has been my observation that very often he is assessed a token penalty. The violator is often a neighbor. As long as he gets a penalty of, let us say, five dollars and costs, the violator gets away with everything and doesn't care. I don't think that type of system is conducive to checking game law violations.

There are some great problems in instituting reform, but you will be happy to know that last fall, in New Mexico, a Justice of the Peace was involved in an illegal elk kill. In fact, the game officer brought the violator before another Justice of the Peace. I forget whether he let the violator off completely or with a token fine. However, this game officer complained, and they took administrative action and went to the Supreme Court in New Mexico and they effectively eliminated that Justice of the Peace on the basis of his action in that case.

The point I am trying to make is that certainly the conservation officer has a responsibility, but the courts have an equal responsibility and from my observation and from talking to a number of WCA's the courts have not been living up fully to their responsibility of adequately punishing game law violators.

MR. NATHAN BIRD [Forest Service]: I was surprised at the difference in the results of the anti-hunting polls. I believe that Joe Horvath indicated a figure of less than six percent anti-hunting results and that others had considerably more.

Now, as I thought about the questionnaire that Joe had, I recall that almost any person could identify with that questionnaire—enjoyment of wildlife, et cetera, and so I was wondering if any of the panelists happened to be thinking that when a person receives a questionnaire, he zeros in on the problem that he is personally interested in. Now, I wonder if that would involve different results than if, let us say, a person had received a

general questionnaire, at least one he could identify with a part of, and, in turn, if that could explain some differences and results on the anti-hunting scene?

DISCUSSION LEADER DRIVER: Certainly, the wording, formulating, and method of administration will influence response. We know also that questionnaires are instruments for change. They have been used as such, particularly after riots in black communities and in studies connected with educational intervention.

On this matter, please let me iterate my summary remarks. You have to be very careful when you are comparing different types of surveys in terms of how the instruments are administered and how they are worded. The whole area of anti-hunting, for example, is one in which you have to be careful, especially when quoting statistics. You have to know exactly what specific attitude or behavior the statistics describe because different words prompt different responses. For example, in connection with the New York study, 89 percent of the landowners said that they had at least one adverse experience with hunters but only 23 percent expressed an anti-hunting sentiment. It is a very tricky area and you have to be extremely careful what conclusions you draw.

CHAIRMAN LUCAS: I would like to suggest there may be real cultural difference here also. I would speculate, for example, that the southerner's way of life, could well be more favorable to hunting at this time in our history than it would be, let us say in the Northeast and perhaps the Midwest. In turn, the Midwest might be somewhat intermediate, between higher anti-hunting feeling in the Northeast and lower sentiments of that sort in that South. This is just a speculation.

MR. HORVATH: We found that 5.46 percent opposed hunting in the Southeast. But in Maryland it went up to 15.6 percent, while in Mississippi it was only 1.78 percent. In the Coastal Fringe Counties, it was 10.8, while in the other regions it was only 4 percent.

DR. RANDALL: [Everett, Washington]: With regard to changing attitudes toward hunting, I know that our organization, the Washington State Sportsmen's Council, working with our Washington State Game Department, started a voluntary wildlife patrol that has been very effective not only in helping our wildlife agents by reporting incidents like the many described by our panelists, but also has certainly improved our landowners' responses and sportsmen relationship. It has also helped immensely with regard to the judges in the small courts, particularly when enough of us appear at hearings on violations to show our interest in trying to make our hunters behave. It has been very effective.

I am sure that our Washington State Game Department, upon request, would be more than happy to give those that might be interested statistics on the results. The last season, for example, was our third year in using this. We have had very good response.

With the massive efforts to create more National Parks wilderness areas, I wonder about the amount of money that our Department of the Interior is allocating to the parks and wilderness areas, whether they are having to spend more time and money on people management and are eliminating fish and wildlife management in the parks and wilderness areas.

The very many visitors that come into our state are disappointed in not being able to see any of the wildlife that the State of Washington is supposed to have. The budget here seems to be going mainly toward highway maintenance and other forms of expenditure rather than toward the management of wildlife. This, in turn, is putting more strain on our Game Departments, upon the hunters who are paying to manage the wildlife outside of the parks and wilderness areas.

This is a long way around but I wonder if the National Park Service is fulfilling its duties that the National Park Act of 1914 had set out for them?

DISCUSSION LEADER DRIVER: Does anyone want to respond to that?

We would need the help of a representative from the Park Service or Department of the Interior, to handle that appropriately.

MR. ROBERT MEEK [Ohio]: For several years I have been concerned with our use of the term "consumptive uses" of wildlife as opposed to nonconsumptive uses. I have heard these terms used several times with reference to hunting and nonhunting land use situations.

Often we coin terms that are relevant at the time but that later become either not relevant or misleading.

I believe that our current use of the term "consumptive" and "nonconsumptive" has

become not only misleading but we have also reached the point in much of the world where aesthetics have become a prime concern.

Therefore, I would rather see us use the term "direct" and "indirect" wildlife mortality, which more honestly depicts the situation as I believe it now exists.

DISCUSSION LEADER DRIVER: The applause indicates that you have some agreement from the audience. This, however, is an issue that cannot be resolved at one minute to twelve. Maybe we can discuss this issue after we adjourn our regular session here.

At this point, I would like to close on a personal note and refer to our session Chairman.

Those of us who worked with Bob Lucas in organizing this session know that Bob is a nice guy to work with, very competent, and a self-effacing fellow. He did not, as a matter of fact, even introduce himself to this session. Therefore, I would like to embarrass Bob with a hand of appreciation for the good job he has done.

CHAIRMAN LUCAS: At this point all I can say is that this session is closed. Thank you for coming.

# TECHNICAL SESSION

Tuesday Morning—April 2

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## Predators: Research, Management, and Policy

*Chairman:*

FREDERIC H. WAGNER

Professor, Utah State University, Logan

*Discussion Leader:*

ROBERT A. JANTZEN

Director, Game and Fish Department, Phoenix, Arizona

## Remarks of the Chairman

Frederic H. Wagner

The subject we are addressing today is one of the more complex problems that we face in wildlife ecology. It is complex biologically, but the more difficult problems to come to grips with are philosophical. Therefore, it is one of the more controversial subjects socially and politically.

We have tried to put together a provocative program. You may hear views set forth in some of the papers with which you don't agree and we invite you to express your contrary views on the subjects.

We are beginning this morning with a panel of three speakers, each addressing his paper to the question of the effects of predators on the densities of game populations. At least two of the speakers will discuss whether or not wildlife management agencies should engage in predator control as a management technique. This has been a "hot potato" in American game management, although it is noteworthy that in European gamekeeping, intensive predator control has been used for many years.

We think it is fair to ask that you look at this question as two separate ones: one, the biological question of whether or not and, if so, to what extent predators influence game populations; and, secondly, the policy and management question of whether or not predator control should be engaged in as a management technique. Is there a general answer to the question or should each situation be addressed individually on its own merits?

Without any further ado, I will introduce our first speaker, Mr. Steven Byers, who is Acting Leader of the Wildlife Ecology Group of the Industrial BIO-TEST Laboratories at Northbrook, Illinois.



# Predator-Prey Relationships on an Iowa Waterfowl Nesting Area

Steven Michael Byers

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## Introduction

Diminishing waterfowl nesting habitat and declining breeding populations have resulted in intensive management practices on waterfowl production areas. Recent publications on predator removal (Balsler *et al.* 1968; Lynch 1972) and management of nesting cover to decrease predation (Duebbert 1969; Schranck 1972) reflect this trend. Such predator management indicates the need for an analysis of the factors that affect nest predation. It has long been understood, for example, that predation can best be appraised if studied simultaneously from the standpoints of predator and prey (Errington 1935). Allen (1949) called for year-to-year studies of different populations to provide data on predator-prey relationships. Such long-term studies on predation by great horned owls (*Bubo virginianus*) on bobwhite quail (*Colinus virginianus*) (Errington *et al.* 1940:760) and ruffed grouse (*Bonasa umbellus*) (Rusch *et al.* 1972) have demonstrated the importance of numbers of alternate prey in reducing losses of game populations to predation.

Such buffering in natural predator-prey relationships may also function in waterfowl nesting success. Population indices of some potential nest predators and prey were studied for a 3-year period to determine causes of nest losses and evaluate the importance of predator-prey interactions in nest losses of blue-winged teal (*Anas discors*). Dewey's Pasture, a state-owned waterfowl management area in northwest Iowa, was selected for this study because of its history of intensive use by blue-winged teal and the high loss of nests attributed to predators (Bennett 1938; Glover 1949). Nesting success of blue-winged teal on Dewey's Pasture had varied from 0 percent for 103 nests in 1967 to 82 percent for 81 nests in 1972 (M. W. Weller, unpublished data).

This study was financed by the Iowa Pittman-Robertson Federal Aid in Wildlife Restoration Program, Project W-113-R from 1970 to 1972, with the Iowa Conservation Commission and Iowa State University cooperating. I am especially grateful to Dr. Milton W. Weller for his advice and encouragement throughout the study and to Robert L. Howard for his efforts during the first year of the study. Glenn Jones and Thomas Neal of the Iowa Conservation Commission were helpful in providing assistance, materials, and facilities throughout the study.

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## Methods

### *Nest Losses in Blue-winged Teal*

The extent and cause of nest losses were evaluated with simulated waterfowl nests (Hammond 1969). During a 3-year period, 106 simulated nests were established. Each nest consisted of one chicken egg placed in a depression in the vegetation 25 feet north of a destroyed blue-winged teal nest. During 1970 and 1971, tracks of predators were observed by placing a patch of sand 1-foot in diameter 8 to 10 inches from the simulated nest. Mammals which disturbed the nest usually left tracks suitable for identification. To improve tracks for 1972, sand was placed over axle grease in a tray 12 by 16 inches. After three weekly checks, intact nests were termed successful.

At each simulated nest, the plant species, cover height, litter depth, and plant density were recorded. Plant density was estimated using Hammond's (1969) three cover density classes based on the relative ease of movement that the cover would offer to egg-eating mammals.

Causes of blue-winged teal nest losses were determined using Rearden's (1951) techniques based on the condition of the nest structure, presence of egg shells, and the nature of the damage to the shells.

### *Predator Abundance*

Predators were live-trapped with number one National box traps during the 1971 and 1972 field seasons. In 1972, additional wooden box traps (12" by 16" by 24") were used in an effort to increase trap success. Numbers of trap-nights and striped skunks (*Mephitis mephitis*) captured were recorded and number of skunks captured per 1,000 trap-nights was tabulated to provide an index of striped skunk abundance for each year (Verts 1967).

### *Buffer Prey Abundance*

Two small mammal censuses were conducted yearly on each of two study areas located on Dewey's Pasture. Each study area included three zones adjacent to semipermanent marsh: wet meadow, hillside, and hilltop habitats.

The trapping pattern within each study area consisted of three modified North American Census of Small Mammal traplines (Calhoun and Casby 1958). The interval between stations was shortened from 50 to 25 feet to keep the traplines in uniform habitats. Each trapline consisted of 20 stations at which three Museum Special snap traps were set. Thus, each trapline consisted of 60 snap traps extending along a line 475 feet long. Traps were checked twice daily, during early morning and late afternoon. Three 7-day censuses were made in 1970, with four each conducted in 1971 and 1972. For comparative purposes, population indices were based on the same three trapping periods as were used in 1970. Lines I, II and III were trapped from 9 June to 15 June, inclusive, and were trapped again from 7 July to 13 July, inclusive, for 1970-72. Lines IV, V, and VI were trapped from 23 June to 30 June, inclusive, for 1970-72 and again from 21 July to 27 July, inclusive, for 1971-72. Lines I and IV were placed in wet meadows, lines II and V on bluegrass hillsides, and lines III and VI on dry bluegrass hilltops.

At 20 points along each trapline, the plant species composition, cover height,



litter depth, and an estimate of plant density were measured. Each point was selected in a random direction (eight compass points) and random distance (one to five feet at 1-foot intervals) from the center of each trapping station.

#### *Analysis of Scat Contents*

Scats of potential nest predators were collected on Dewey's Pasture and immediate surroundings. Each scat was identified to species and analyzed according to Martin's (1949) standard food habits procedures. The initial volume of each scat was measured by displacement of water in a 300-ml graduated cylinder. Each scat was then dried at 130° F for approximately 24 hours. Major food items were then separated and identified with a 7X to 30X Bausch and Lomb binocular dissecting scope.

### **Results**

#### *Nest Losses in Blue-winged Teal*

Success of simulated nests was consistent throughout the three field seasons ranging from 22.6 percent to 24.0 percent with a mean of 22.9 percent  $\pm$  S.E. 0.61. Data from simulated nests indicate that for the 3-year period: (1) striped skunks accounted for 51.8 percent of the nest losses; (2) most nests (58.7 percent) were found by predators within one week, with discovery declining steadily thereafter; (3) predators could not be identified for 30.3 percent of the nests; and (4) shallow trays used in 1972 increased predator identification 19.8 percent over 1971.

Among the vegetative parameters measured at simulated nesting sites, there was no significant effect on nest success in 1971 or 1972. Simulated nests having a deeper litter depth, denser cover, and greater cover height were not more successful.

Blue-winged teal nesting success, however, fluctuated from 31.0 percent in 1971 to 82.0 percent in 1972 during the field seasons with a mean of 54.3  $\pm$  S.E. 14.9. Nest losses of blue-winged teal, examined with Rearden's predator identification techniques, showed agreement with simulated nesting results: (1) striped skunks accounted for a high percentage (60.6 percent) of the nest losses, and (2) predators could not be identified with 33.1 percent of the nests.

#### *Predator Abundance in Relation to Nest Losses*

More skunks were caught in 1971 (7) than in 1972 (5), although there was a greater number of trap-nights in 1972 (374) than in 1971 (281). Skunks caught per 1,000 trap-nights declined from 1971 (24.9) to 1972 (13.4), indicating a downward trend in the number of striped skunks. This downward trend in 1972 was coupled with an increase of 50 percent in blue-winged teal nesting success.

#### *Buffer Prey Abundance in Relation to Nest Losses*

Each small mammal census area consisted of three habitat types. The wet meadows adjacent to semipermanent marshes were predominantly a cordgrass-sedge (*Spartina-Carex*) association, while the hillsides and drier hill-tops were predominantly *Poa pratensis*. Vegetational parameters measured

**Table 1. Total mammal catch and species analyzed by two-way analysis of variance (Snedecor and Cochran 1967) for 1970-72.**

Grouping analyzed	Test result (f value)	
	Among years	Among habitats
Total mammal catch	17.91 <sup>a</sup>	5.16 <sup>b</sup>
<i>Microtus pennsylvanicus</i>	17.49 <sup>a</sup>	1.13
<i>Sorex cinereus</i>	3.50	7.50 <sup>a</sup>
<i>Citellus tridecemlineatus</i>	0.50	2.19
<i>Peromyscus maniculatus</i>	0.07	0.07
<i>Zapus hudsonius</i>	4.00	3.49
<i>Blarina brevicauda</i>	4.00	1.13

<sup>a</sup>Significant at (P<0.05).

<sup>b</sup>Significant at (P<0.10).

showed that the wet meadow had greater cover height, density, and litter depth than the hillside or hilltop.

Small mammal catch data were analyzed by two-way analysis of variance (Snedecor & Cochran 1967) which indicated a significant difference (P<0.05) among the three years in the total number of small mammals captured and a significant difference (P<0.10) among the three habitats in numbers captured (Table 1).

Of the mammal species analyzed, only a vole (*Microtus pennsylvanicus*) differed significantly among years and a shrew (*Sorex cinereus*) among habitats (Table 1).

*Sorex cinereus* was the dominant small mammal constituting 54.1 percent of the total catch. *Sorex cinereus* and *Microtus pennsylvanicus* together completely dominated the small mammal population with 86.9 percent of the total catch.

The total number of small mammals caught during the first three trapping periods of each year was significantly correlated ( $r = +0.997$ ;  $P < 0.10$ ) with blue-winged teal nesting success for the 3-year period (Table 2). Correlation of numbers of small mammals caught, excluding *S. cinereus*, with blue-winged teal nesting success was highly significant ( $r = +0.999$ ;  $P < 0.05$ ). Numbers of *S. cinereus* were excluded because Verts (1967) showed they were avoided by striped skunks. Data from the first trapping period, 9 June to 15 June, also were compared with nesting success (Table 2) since this period most closely coincides with nesting and incubation of blue-winged teal on Dewey's Pasture (Bennett 1938). Although not significant, the correlation coefficient of the first trapping period mammal catch with blue-winged teal nesting success was high ( $r = +0.977$ ).

Vole (*Microtus pennsylvanicus*) indices were not significantly correlated ( $r = +0.978$ ) with blue-winged teal nesting success for the first three trapping periods. It is apparent, however, that this prey population is largely responsible for the high correlation between total mammal catch and nesting success. *Microtus pennsylvanicus* indices for the first trapping period were significantly correlated ( $r = +0.996$ ;  $P < 0.10$ ) with nesting success suggesting the importance of this prey species early in the nesting season.

**Table 2. Correlation of small mammal population indices with blue-winged teal nesting success for 1970-72.**

Year	Nesting success of blue-winged teal	Small mammal population indices				
		(1)	(2)	(3)	(4)	(5)
1970	50.0%	217	82	46	41	31
1971	31.0%	158	32	18	13	9
1972	82.0%	352	200	174	63	56
Correlation of nesting success:		.997 <sup>b</sup>	.999 <sup>a</sup>	.978	.977	.996 <sup>b</sup>

(1) Total mammal catch for 3 trapping periods.

(2) Total mammal catch for 3 trapping periods (excluding *Sorex cinereus*).

(3) *Microtus pennsylvanicus* total catch for 3 trapping periods.

(4) Total mammal catch for first trapping period (excluding *S. cinereus*).

(5) *Microtus pennsylvanicus* total catch for first trapping period.

<sup>a</sup>Significant at (P<0.05).

<sup>b</sup>Significant at (P<0.10).

#### *Analysis of Scat Contents*

Analysis of 163 scats during the 3-year period included frequency of occurrence and percent volume of various food items for each predatory species.

The occurrence of small mammal remains in scats of red fox (*Vulpes fulva*), mink (*Mustela vison*) and striped skunks was lowest in 1971 when small mammal abundance was lowest. In 1972 when small mammal abundance increased, the frequency of occurrence as well as the percent volume of mammal remains increased for these three predatory species.

Occurrence of *Microtus pennsylvanicus* remains in all scats was found significantly correlated ( $r = +0.998$ ;  $P < 0.05$ ) with numbers of *M. pennsylvanicus* caught over a 3-year period. This correlation suggests that predation of *M. pennsylvanicus* tended to be proportional to its availability.

#### **Discussion**

Simulated nesting studies and use of Rearden's (1951) nest predator identification technique on nests of blue-winged teal in northwestern Iowa showed agreement with Keith's (1961) findings in Alberta and Moyle's (1964) findings in Minnesota that striped skunks cause extensive nest losses in upland nesting waterfowl. Simulated nests, however, did not accurately reflect nest losses observed on actual blue-winged teal nests. In addition, data from simulated nests did not show agreement with findings by Heiser (1971) for blue-winged teal on Dewey's Pasture that dense cover, litter depth, and effective cover height induced higher nest success. Differences in predation between simulated nests and blue-winged teal nests may have resulted from placement 25 feet

north of previously destroyed blue-winged teal nests, greater human disturbance with simulated nests, or to the use of track-recording trays adjacent to simulated nests.

Upland waterfowl nesting success has been shown to be a function of nesting cover and density (Duebbert 1969). During the 3-year study, vegetative parameters at blue-winged teal nest sites were not quantified. However, observations suggest no change in nesting cover and density which would account for the wide fluctuation in blue-winged teal nesting success.

Predator abundance, shown by Balsler *et al.* (1968) to be important to upland waterfowl nesting success, was inversely related to blue-winged teal nesting success in the study. The number of skunks captured was so small during the two years, however, that population trends based on live-trapping results may be questionable. Darrow (1945) and Komarek (1937) have stated that increased numbers of small mammals attract a higher predator population which negates the buffering effect. In contrast to those two studies, a sixfold increase in small mammals was not followed by an increase in predator numbers.

Buffering effects have been observed in predator-prey interactions for ruffed grouse by Rusch *et al.* (1972) and Bump *et al.* (1947:321-322). Scott and Klimstra (1955) observed an increased proportion of nest losses in bobwhite quail due to foxes when normal prey items of the fox were declining. Verts (1967) stated the importance of availability, accessibility, and abundance of small mammals in the feeding behavior of striped skunks. With that feeding response in mind, the number of small mammals caught in traplines was correlated with blue-winged teal nesting success. Results were significant, suggesting that nesting success was buffered by small mammal populations.

Occurrence of mammal remains, especially of *Microtus pennsylvanicus*, in scats was closely related to small mammal and *M. pennsylvanicus* population indices for the 3-year period. These findings parallel Scott's (1947) observations that occurrence of mammal remains in fox scats followed closely their relative abundance.

The detrimental effects of grazing on small mammal species composition and abundance (Krapu *et al.* 1970), and the role of fire through its effects on grassland succession (Tester and Marshall 1961), suggest methods by which good nesting cover indirectly benefits small mammal populations. McCabe and Kozicky (1972) state there is a moral responsibility to control predators without greatly disrupting organisms within the ecosystem. In view of this concern, the role of buffer species in shifting predation away from upland nesting waterfowl should be further investigated.

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# Intensive Short-Term Predator Removal as a Game Management Tool

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## Introduction

The phenomenon of predation is an exceedingly complex ecological problem that is difficult to interpret biologically. This problem is understandably difficult because there can be so many interacting variables. The literature is replete with predatory animal food habits studies based on stomach and/or scat analyses, most of which indicate that game animals make up only a small percentage of the total diet (Langenbach and McDowell 1939, Sperry 1941, Kozicky 1943, Leach and Frazier 1953, Korschgen 1957, Truett and Day 1966, and others). Almost without exception, however, these studies are not combined with density estimates of the various prey items, an unfortunate circumstance that admittedly renders the data difficult to analyze. A predator population likely has the same impact on a low density prey population that comprises only a small percentage of the predator's food as it has on a high density prey population that makes up the major portion of the diet. Some of the other problems inherent with predator food habits studies have been summarized by Latham (1951).

Experimental predator removal, in conjunction with control areas, practically eliminates all variables except predation, if the areas are matched so that all environmental factors are equal. To be effective, however, this method must be combined with an objective assessment of the effect of the predator removal operations on the predator population. Few studies have produced this information. Jones (1949) believed that coyote predation on fawns was the main factor limiting the increase of pronghorn antelope (*Antilocapra americana*) in Texas. He tried to remove coyotes (*Canis latrans*) from two areas to test the effect on fawn mortality but with limited success. He attributed the lack of increased fawn numbers to the inability to remove predators as fast as they moved in from surrounding areas. Intensive predator removal efforts in New York reduced ruffed grouse (*Bonasa umbellus*) nest destruction but failed to increase grouse density in the fall over density levels on control areas (Edminster 1939). In a California deer (*Odocoileus hemionus*) study, Longhurst *et al.* (1952) concluded that, while the results were not entirely conclusive, there was no evidence that fawn survival increased in the area where coyotes were heavily trapped over what it was in the check area which was allowed to carry a normal coyote population. Actually, fawns were found to be more numerous on the area where coyote removal was not practiced. A similar study with wild turkeys (*Meleagris gallopavo*) in New Mexico failed to increase turkey populations in the experimental predator removal area (MacDonald 1966).

Studies also have been completed which show that predator removal has an enhancing effect on prey populations. In Arizona, Arrington and Edwards (1951) showed that intensive use of predator control was followed by an

increase in antelope to the point where they were once again huntable, whereas, on control areas this increase was not noted. In Minnesota an increase in waterfowl (Balsler *et al.* 1968) and pheasant (*Phasianus colchicus*) (Chesness *et al.* 1968) productivity was demonstrated on experimental predator removal areas but not on control areas. Caribou (*Rangifer tarandus*) calf survival in Newfoundland was increased almost 100 percent over the control area by the experimental removal of lynx (*Lynx canadensis*) (Bergerud 1971).

The difficulty of monitoring most predator populations possibly explains the apparent discrepancies between some of these studies. It is difficult to determine, in the studies that showed no appreciable difference between predator removal and control areas, whether the negative results were due to insignificant predation or insignificant predator removal. The only generalization that can be drawn, it seems, is that these studies present evidence that predation may curtail game animal populations in some areas and not in others. This is not surprising when considering the many differences in predator:prey ratios, buffer species, and available habitat that can occur between areas.

The primary objective of this research effort was to assess the impact of predation on wild turkey, white-tailed deer (*Odocoileus virginianus*) and bobwhite quail (*Colinus virginianus*) reproductive success. In addition, buffer species were monitored to determine their role in the overall predator-prey relationship in the area. Knowlton (1964) found no evidence that coyotes or bobcats suppressed turkey numbers in South Texas. Fawn predation, however, has been shown to be a major factor limiting population increases on the Welder Wildlife Refuge in South Texas (Knowlton 1964 and 1968, Cook *et al.* 1971). Bobwhite quail appeared to be more vulnerable to predation during the nesting season than at other times of the year (Sperry 1941, Lehmann and Fuller 1943, Knowlton 1964); however, Lehmann (1946) was unable to significantly improve the percentage of successful nests by an intensive trapping program in a South Texas area.

## Study Areas

This study was conducted on the Santa Gertrudis Division of the King Ranch in Kleberg County, South Texas. Vegetation was primarily mesquite (*Prosopis glandulosa*)—brushland interspersed with some native grassland and root-plowed pastures reseeded to introduced grass species. Beasom (1973) described these areas in detail. Two nine-square-mile study areas were delineated approximately five miles apart on this Division. The study areas for this predator impact study were selected to meet the following criteria: 1.) to have the same vegetation and soil types; 2.) to be as far apart as possible to attempt to minimize inter-area influences, and still satisfy requirement number one; 3.) to have similar populations of both predators and prey; and 4.) to have similar surface water relationships.

## Methods

An intensive predator removal program, from 1 February to 30 June in 1971 and 1972, was instituted on the experimental area, whereas light predator control was practiced in the late fall and winter on the control area. The experimental predator removal was conducted by myself and a field assistant in

1971 and by myself in 1972. The predator control on the control area was carried out by a field assistant of the Division of Wildlife Services, U.S. Fish and Wildlife Service and was part of a larger program covering the entire Santa Gertrudis Division. By its very nature, in covering such a large area, a relatively light, primarily coyote control resulted.

The intensive predator removal program consisted of the use of steel traps, M-44's, strychnine alkaloid meat and egg baits, spotlight hunting at night, and hunting with the aid of various predator calling devices. The intensity of removal efforts in 1971 and 1972, respectively, for each of the methods was as follows: steel traps 11,554 and 15,892 trap nights; M-44's 7,400 and 5,433 set nights; strychnine eggs 2,000 and 2,000 baits; strychnine meat 3,500 and 4,500 baits; and hunting 200 and 50 man hours.

The impact of these removal efforts on predator populations was assessed by monthly track transect lines in each area to derive indices of population density. Two 2-mile sandy roads were selected in each area on which the counts were made. Counts were made on three consecutive days, when possible, at the end of each month from January 1971 through October 1972.

Game and nongame animal populations were enumerated by a series of road transects, aerial transects, or trap indices. White-tailed deer and wild turkey reproductive success was assessed in August by helicopter counts. The transects employed provided an approximately 50 percent coverage of each study area. Bobwhite quail reproductive success was assessed from counts made from June through August from road transects on the two areas. Turkey population dynamics data were also collected from these transects. Rodent abundance on each area was determined by trap-night indices from a series of 11 transects set up on each area. The transects were run in January each year, to get an index to rodent abundance prior to the initiation of predator removal, and then again in late May near the end of the annual predator removal period to determine what impact mammalian predation had on the control area rodent population. The same transects were used on each area in all four trapping periods.

## Results

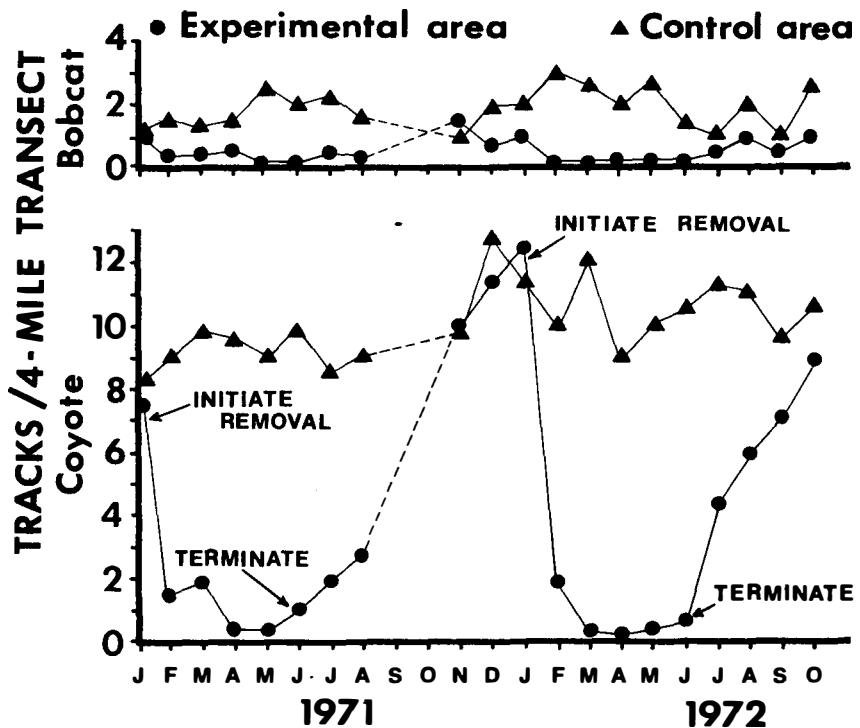
The major predatory mammals taken by all methods on the experimental area were coyotes, bobcats (*Lynx rufus*), raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), opossums (*Didelphis marsupialis*), and badgers (*Taxidea taxus*) (Table 1). Numbers of coyotes killed declined from 129 in 1971 to 59 in 1972 and bobcats from 66 to 54, whereas the other species increased. Disregarding immigration, the coyotes removed in 1971 represented a density of more than 14 per section, whereas approximately 6.5 per section were removed in 1972. Field observation indicated that similar numbers were on the area prior to removal, and a similar reduction level was attained in both years. If these indications were correct, coyotes, and to a lesser extent bobcats, must have ranged over a greater area in 1971 and thus had a higher immigration rate into the area.

The predator track transect counts at the end of each month indicated that in January, 1971, prior to the initiation of the predator removal program, coyotes and bobcats were recorded in approximately equal numbers on the



**Table 1.** Numbers of the principle target species taken by all methods combined in the South Texas experimental predator removal program, 1971 and 1972.

Species	1971	1972	Total
Coyote ( <i>Canis latrans</i> )	129	59	188
Bobcat ( <i>Lynx rufus</i> )	66	54	120
Raccoon ( <i>Procyon lotor</i> )	31	34	65
Striped skunk ( <i>Mephitis mephitis</i> )	22	24	46
Badger ( <i>Taxidea taxus</i> )	5	13	18
Opossum ( <i>Didelphis marsupialis</i> )	6	11	17
Hog-nosed skunk ( <i>Conepatus leuconotus</i> )	0	2	2
Spotted skunk ( <i>Spilogale putorius</i> )	1	0	1



**Figure 1.** Coyote and bobcat tracks per 4-mile road count transect on the South Texas experimental predator removal and control areas from January, 1971 to October, 1972.

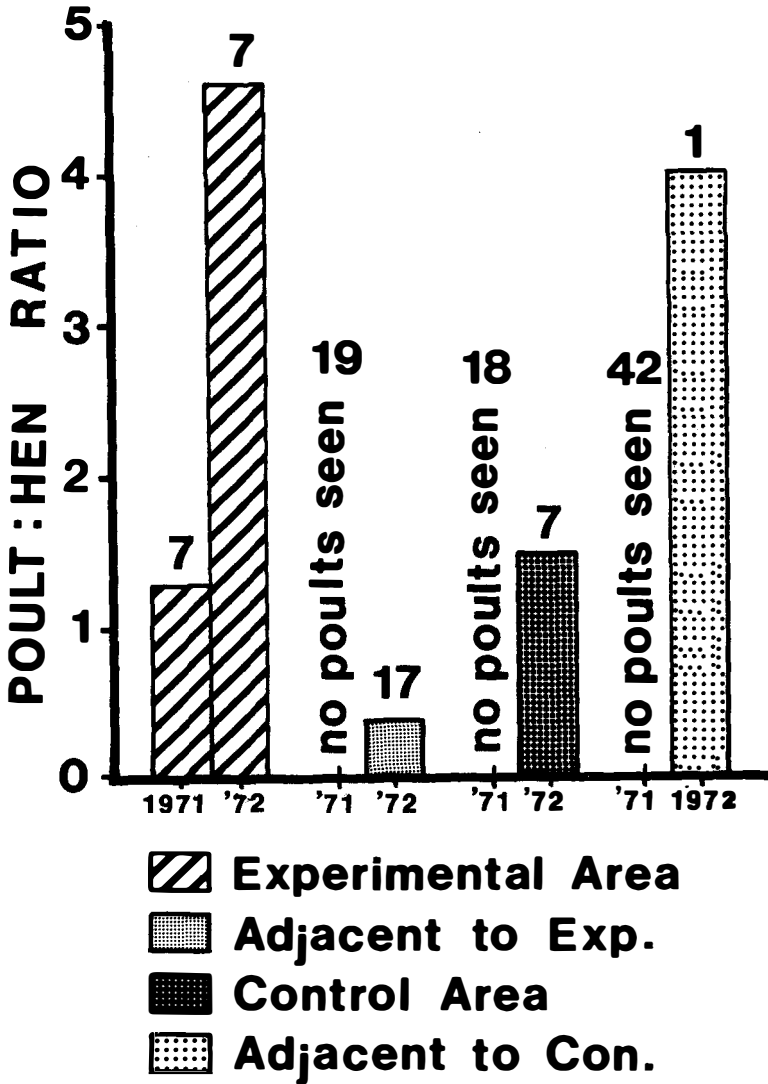
experimental and control areas (Fig. 1). The February count was after one month of intensive removal, and coyote tracks on the experimental area dropped from approximately 7.5 per 4-mile transect to 1.5, whereas the bobcat dropped from 1.0 to less than 0.5. Both species, on the control area, maintained similar levels throughout the first experimental period. On the experimental area, however, coyote and bobcat tracks continued to decline until approaching or attaining zero. When the first experimental predator removal program terminated at the end of June both species began an immediate increase and, by at least November, the two areas once again apparently maintained similar numbers. The same pattern was exhibited by the second experimental period in 1972. Track counts of the smaller predators were very erratic throughout. On most counts none were recorded.

White-tailed deer reproductive success, as determined by the August helicopter counts, revealed large differences between areas and between years. In 1971 the experimental area fawn: doe ratio of slightly less than 0.5 was approximately 300 to 400 percent higher than that on the control area or any of the adjacent areas checked. The following year conditions were improved environmentally and vegetatively, and there was a corresponding increase in fawn production on all areas. The experimental area fawn:doe ratio, however, was over 0.8 and was still from 200 to 300 percent greater than the other areas (Beasom, in press).

Reproductive success for the wild turkey, as assessed by road and aerial transects, was substantially greater in the experimental area both years. Poults:hen ratios were determined by road transects to have been 0.8 on the experimental area in 1971, whereas no poults were seen on the control area. The August helicopter counts revealed a similar pattern in that the poult:hen ratio on the experimental area was approximately 1.3, and no poults were recorded on the control area (Fig. 2). In 1972 the reproductive differences were maintained. Poults:hen ratios calculated from the road counts were 7.9 for the experimental area and 4.4 for the control, whereas aerial counts revealed ratios of 4.6 and 0.6, respectively.

Total numbers of poults produced on each area were estimated by keeping records of all different poult-hen groups noted during the road transect counts. These numbers were likely minimum estimates since it was unlikely, in 10 repetitions, to see every group on the area, even though a 50 percent sample was made. By this method 51 young turkeys were believed to have been produced on the experimental area in 1971 compared to zero on the control area. Better reproductive success was noted on both areas in 1972, but the experimental area still produced 283 poults while only 159 were located on the control area. The significant regression ( $F=3.46^{**}$ ,  $P<0.01$ ) on turkey age ratio throughout the road transect count period on the control area in 1972 indicated that more poults were lost to predation there than in the experimental area where no significant regression ( $F=0.263$ ,  $P>0.05$ ) was noted. This comparison could not be made in 1971 since there were no young turkeys on the control area, but the age ratio maintained stability on the experimental area.

Road transect counts of bobwhite quail indicated a similar pattern to both the wild turkey and the white-tailed deer; higher reproductive success in 1972 than in 1971 and higher in both years on the experimental area than the control.



**Figure 2.** Wild turkey poult:hen ratios, as determined by aerial transects, on the experimental and control areas with an area adjacent to each, 1971 and 1972. Numbers represent hens sighted in each count.

The percent increase in population through reproduction on the experimental area was 98.7 in 1971 compared to 39.2 on the control (Table 2). Conditions were improved somewhat in 1972 and the corresponding respective values were 213.8 and 165.6 for the two areas. The other indices of reproductive success (young per adult female, average brood size, and percent hens without

**Table 2. Indices of bobwhite quail reproductive success in the experimental predator removal and control areas in South Texas, 1971 and 1972.**

Index	Experimental Area		Control	
	1971	1972	1971	1972
Number of adult females	134.0	338.0	79.0	254.0
Young/adult female	2.3	4.5	0.9	3.6
Average brood size	9.6	6.7	6.2	6.5
Percent hens without young	76.5	32.0	86.1	44.5
Percent increase in population	98.7	213.8	39.2	154.6

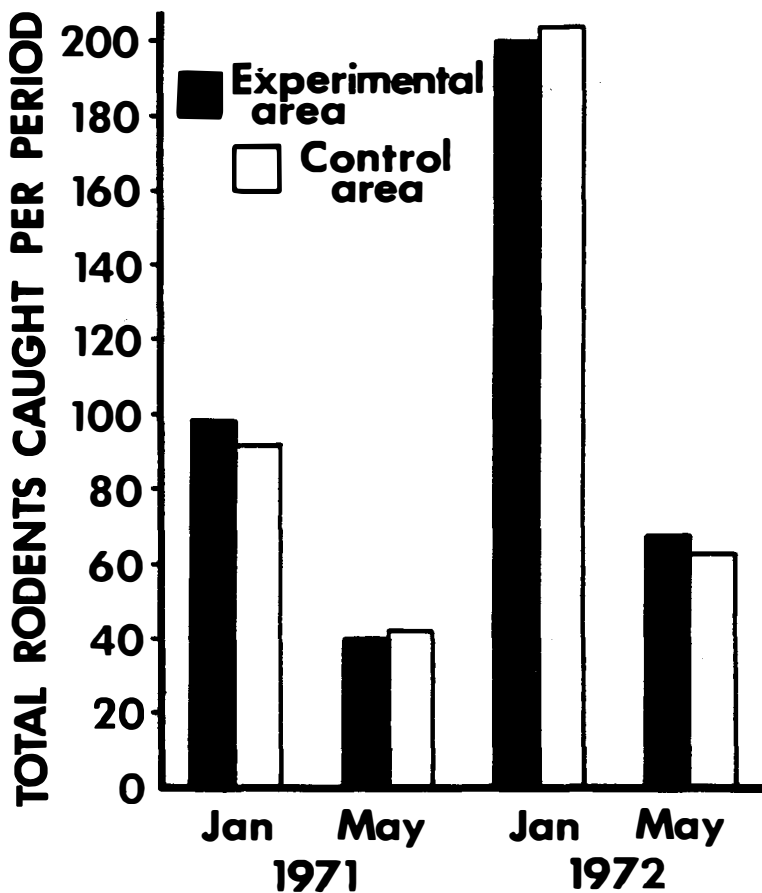
young) all exhibited the same pattern with the most favorable values always representative of the experimental area.

The weekly age ratio calculations were tested between areas and within years by the paired *t* statistic. Sufficient evidence is lacking in both years to conclude that the two areas had different age ratios ( $P > 0.05$ ); however, the experimental area had higher values in both years (Table 2).

In January 1971, prior to the initiation of the predator removal program, the total number of rodents caught in 556 trap-nights on the experimental area was 98, compared to 92 on the control area (Fig. 3). In May, after four months of intensive (and apparently successful) predator removal, the respective rodent catches with the same amount of effort were 40 and 42 on the two areas. The numbers of rodents caught in January 1972 indicated an increase in abundance over the previous year, inasmuch as there were over 100 percent more recorded. A decrease similar to 1971 was noted by the May trapping period. The cause of this decline was probably due to an increase in food supply by May making the animals more difficult to trap, rather than to a decrease in rodent numbers. Based on rodents seen while driving study area roads, there were at least as many, if not more, in May 1972 than there had been in January 1972. In 1971, however, few rodents were seen at any time.

Rodents involved in this area, in order of abundance in the trapping records, were white-footed mouse (*Peromyscus leucopus*), short-tailed grasshopper mouse (*Onychomys leucogaster*), pygmy mouse (*Baiomys taylori*), cotton rat (*Sigmodon hispidus*), long-tailed harvest mouse (*Reithrodontomys fulvescens*) and hispid pocket mouse (*Perognathus hispidus*). The cotton rat increased constantly throughout the study period and did not undergo the apparent decline in May as did all other species. There was an indication that the increase in cotton rats was accompanied by a decrease in the other species. There was one short-tailed shrew (*Blarina brevicauda*) taken on the control area in May 1972.

A hypothetical cost-benefit analysis indicated it would be economically feasible to institute an intensive predator control program to bolster turkey and deer populations only if a substantial portion of the surplus animals produced are harvested. Under Plan A (Table 3) it is assumed that 100 percent of the



**Figure 3.** Total rodent catch out of 556 trap-nights on each area in each trapping period on the South Texas experimental predator removal and control areas in January (prior to initiation of predator removal) and May (near termination of removal), 1971 and 1972.

surplus produced is harvested. In this study this included 87 male turkeys and 85 male and 85 female deer. If it is assumed that these animals are, respectively, worth \$50, \$150, and \$50 each to the landowner, then a gross return of \$21,300 is possible from the study area. The returns presented in Table 3 are minimum estimates. In prime South Texas deer range, season leases for hunting often are around \$500 to \$600 per man. Since two male deer can be taken legally, the price estimate in the cost-benefit table could be increased by 100 percent. Conversely, some of the costs presented are maximum estimates because the equipment is still on inventory. If the project were to continue,

**Table 3. Hypothetical cost-benefit analysis of intensive predator removal and hunter harvest of wild turkeys and white-tailed deer on the mesquite experimental study area, 1971 and 1972.<sup>1</sup>**

Items	Costs	Percent of Surplus Harvested		
		100%	50%	10%
Turkey males @ \$50.		\$ 4,350.	\$ 2,175.	\$ 435.
White-tailed deer males @ \$150.		12,750.	6,375	127.
White-tailed deer females @ \$50.		4,200.	2,100.	420.
		\$21,300.	\$10,650.	\$ 982.
Pickup truck rental	\$1,000.			
Field Technician	4,000.			
Steel traps 160 @ \$7.	1,120.			
M-44's 200 @ \$1.35	270.			
Miscellaneous field equipment	100.			
Lethal baits	425.			
Cage for bait collec- tion	50.			
Electronic animal call	150.			
Rifle and cartridges	200.			
	\$7,315	-7,315.	-7,315.	-7,315.
Total Net Benefits		\$13,985.	\$ 3,335.	-\$6,333.
Net Return Per Acre		\$ 2.59	\$ 0.62	\$-1.17

<sup>1</sup>Game considered in the harvest is only that part of the population increases attributable to predator removal, or that which is produced over and above what was produced on the control area in 1971 and 1972.

some of the equipment costs would not have to be met again, the total costs per year would decline, and the net returns would increase by the same margin.

### Discussion

This predator removal program was not instituted simply as an exercise to see how many animals could be eliminated from an area. This was a rigidly controlled effort to produce scientific results from a predator-prey relationship study involving intensive utilization of several predator control techniques. To attain the test objectives the experimental area had to be essentially rid of mammalian carnivores, and the data indicate this was reasonably successful, at least for coyotes and bobcats.

Unfortunately there were several other kinds of game and nongame animals that were accidentally killed or injured by some of the techniques. This seems ironic; destroying the animals that were supposed to benefit from the predator removal. Seventeen turkeys and two bobwhite quail were found dead in steel traps and one white-tailed deer female sustained a broken leg. The losses of nontarget species might be justifiable if, due to the predator removal, the species produced many more animals than had been accidentally killed. This apparently happened with all three of the game animals considered in the present study. Robinson (1961) determined that there was a population increase in some small predatory furbearers in areas where coyotes were intensively harvested in New Mexico, Colorado, and Wyoming. Data on this relationship, with most nontarget animals killed by predator control equipment, are completely lacking in the literature.

The predator removal definitely seemed to enhance reproductive success of wild turkeys, white-tailed deer and, to a lesser extent, bobwhite quail in the present study. It appeared that an intensive short-term predator control program to improve reproductive performance of these species could be successful if instituted just prior to and during the breeding season. During drought years it seemed that predator removal could mean the difference between almost complete failure or relatively high reproductive success. In years of abundant rainfall, however, reproductive success was relatively high without the intensive predator removal, indicating that removal may not be justified in these years unless a more intensive game harvesting program created a need.

The project has been shown to be economically justifiable, but it does not necessarily follow that it was biologically justifiable. In areas inhabited by some of the rare larger predators, such as wolves (*Canis* spp.) or rare nontarget animals that may be adversely affected by predator control operations, such a project would likely be biologically unsound. In South Texas, however, no detrimental effects of the short term, intensive removal program were detected. The predator populations were apparently affected very little, since they repopulated the experimental area each year when removal operations ceased. Rodent populations did not increase on the experimental area. Their numbers seemed to undergo similar fluctuations on both areas. Bobwhite quail numbers were not significantly affected. They were apparently much more prolific than the wild turkey, due to reneating and late summer breeding, and predators had little dampening effect on their reproductive success. Turkeys and deer exhibited large increases in reproductive success and potential increases in density. In effect, it seemed as though the area could produce a sustained yield of both predators and game animals.

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# Relationship of Red Foxes and Other Predators to Populations of Ring-necked Pheasants and Other Prey, South Dakota

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## Introduction

Because they are in such great demand for sport hunting, the matter of maintaining or preferably increasing existing populations of pheasants and other popular game species, in spite of shrinking habitat, continues as a major problem to wildlife administrators and game managers. Progressive upgrading of crop and livestock production goals will undoubtedly promote increasingly clean-farmed and grazed private lands and additional wetlands drainage. Correspondingly accentuated is the necessity and urgency for employing the best game enhancement methods possible for achieving maximum game production and survival from habitat that remains. For achieving that goal, a strong research effort should continue in the interest of providing the basic information required for developing and implementing improved and new habitat and game management methods and techniques.

A study was completed in South Dakota in 1971 in the interest of obtaining basic information on present-day impact of predation for evaluating the feasibility of manipulating population densities of certain small carnivore species, e.g., fox, raccoon, badger and skunk, as a means for increasing upland game bird populations, particularly pheasants. Initially influential in the motivation of this investigation was the intense public interest that prevailed concerning the effect of fox predation upon pheasant populations in South Dakota. Widespread speculation also abounded as to whether fox populations could be effectively reduced by artificial control methods and, if so, whether principal prey species of foxes, *i.e.*, rabbits and mice, would increase to intolerably high population density levels from the agricultural crop depredation point of view.

This paper represents a synopsis of a detailed study completion report prepared for that study<sup>1</sup> (Trautman *et al.* 1973). Its contents primarily consist of results obtained from five years of study concerning the effects of red fox (*Vulpes fulva*) predation upon ring-necked pheasant (*Phasianus colchicus*),

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<sup>1</sup>Pittman-Robertson Federal Aid Project W-75-R-7 through 15, Study F-8.2.

whitetail jackrabbits (*Lepus townsendi*), eastern cottontail rabbits (*Sylvilagus floridanus*) and small rodents, *i.e.*, mice (primarily *Peromyscus maniculatis* and *leucopus* spp.), voles (primarily *Microtus pennsylvanicus* and *orchrogaster* spp.), shrews (primarily *Sorex cinereus* and *Blarina brevicauda*) and thirteen-lined ground squirrels (*Citellus tridecemlineatus*). Involved also are the results concerning the combined predation effects of red foxes, raccoons (*Procyon lotor*), badger (*Taxidea taxus*) and skunk (striped, *Mephitis mephitis* and spotted, *Spilogale putorius*) upon populations of the aforementioned prey species.

### Experimental Design and Study Areas

Experimental design of the study was basically one of treatment and control with four replications. Four study units were established throughout the eastern half of the State, three units consisting of three study areas and one of two study areas. Each of the four units was situated in a somewhat different climatic and land use area (Drieslein 1966). Choice of location of each unit was done so that all general variations in weather and agricultural practices within the main pheasant range were represented (Westin *et al.* 1959).

The investigation began with two study areas in each unit, established in July, 1964.<sup>2</sup> One served as the fox reduction area (A area) where the fox population was controlled. The other area comprised the check area (B area) where fox population was not controlled other than by private fox hunters or as requested by landowners.

In 1966, a third study area (small carnivore reduction or C area) was added to each unit where populations of red foxes, raccoons, badgers and striped and spotted skunks were controlled.

Each of the 11 study areas (Figure 1) was 10 by 10 miles, or 100 square miles in size. The C area of Unit 4 was abandoned in spring, 1967 because farmers objected to the use of strychnine-treated draw stations.

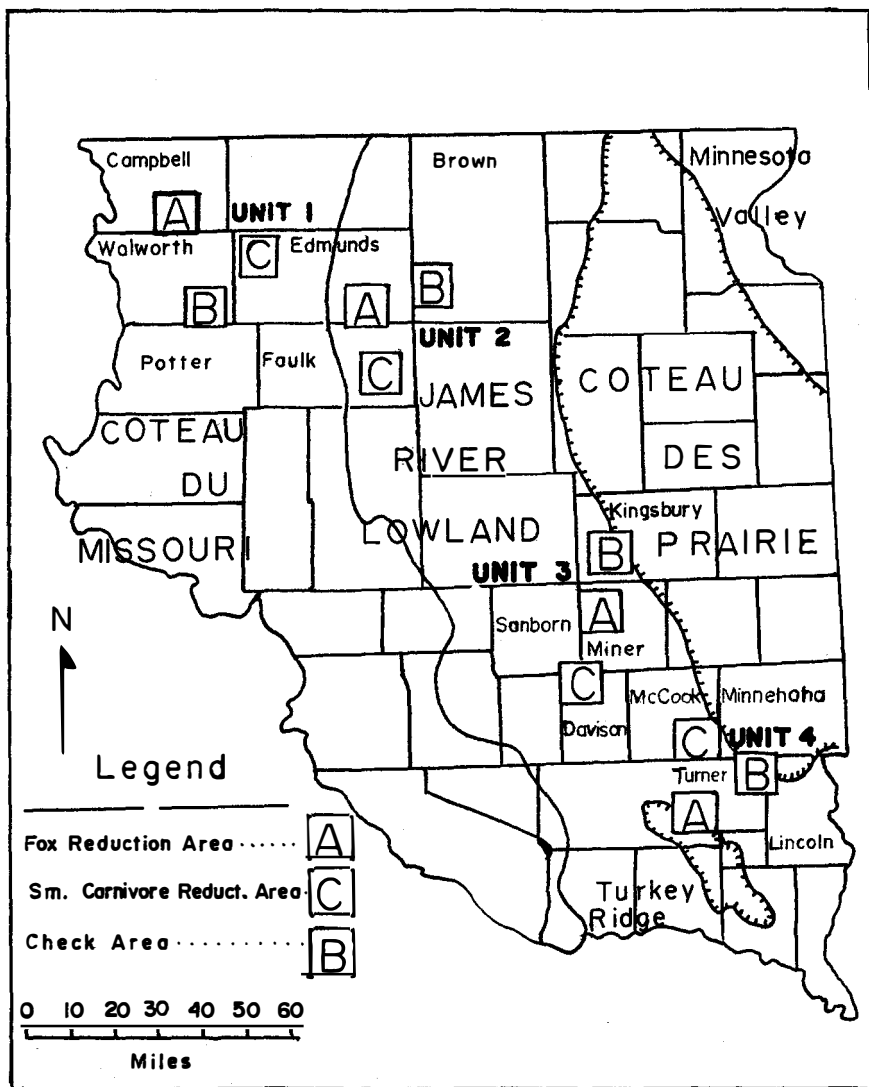
Areas within a unit were located from 5 to 15 miles apart to minimize movement of red foxes from one area to another. Every effort was made to avoid major differences in climate, geography and land use between areas within a given unit. The locations of permanent study areas were not established until preliminary survey results indicated that both fox and pheasant populations between areas among the four units were acceptably comparable.

### Procedures

Sampling methods and techniques employed, and division of labor among participating agencies for gathering pertinent study area data on prey and

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<sup>2</sup>Throughout the 1964-65 and 1965-66 fiscal years, the study was administered jointly by the Department of Game, Fish and Parks, Bureau of Sport Fisheries and Wildlife, the Cooperative Wildlife Research Unit and South Dakota State University Department of Wildlife and Fisheries Sciences. After 1966, following completion of research work towards a Master's Degree by Robert L. Drieslein (1966), all activities involved in the investigation were conducted primarily by the Game, Fish and Parks Department with limited assistance from the Wildlife Services Division of the Bureau of Sport Fisheries and Wildlife.



**Figure 1. Location of Predator-Prey Study Units and Physical Divisions of Eastern South Dakota.**

predator species are briefly described in the following topical sequence. Complete descriptive details are documented in the study completion report (Trautman *et al.* 1973).

*Population Surveys of Pheasants.* Spring (May) and summer (July 20-August 20 period) roadside pheasant census surveys, summer brood-size counts, winter sex ratio and aerial counts were conducted by Game Division and Law Enforcement personnel of the Department of Game, Fish and Parks. Standard

methods were used for all surveys. Sample sizes for spring and summer roadside pheasant census surveys were increased by simultaneously using three 30-mile census routes per study area. This usually afforded a combined total of 45 or more counts (census runs) during a survey period. Accuracy of the birds-per-mile mean from the combined data of 45 counts (per study area) was usually within 10 percent of the true index mean of the population at the 90 percent confidence level. When data of all counts from all like areas were combined, e.g. from all fox reduction areas, etc., accuracy of the overall mean was always within 10 percent of the true index mean at the 95 percent confidence level (Trautman 1970). Data were analyzed primarily by Dr. D. C. Bowden, Colorado State University Statistical Center, Fort Collins.

*Small Rodent Snap-Trap Population Survey.* Snap-trap surveys were conducted by University wildlife technology students and Game Division biologists. The method entailed setting and checking a total of 288 standard mouse traps for four consecutive 24-hour periods on each study area. Six sections were sampled once each summer in each study area as initially randomly selected from each area's inner 36 sections.

*Meadow Vole Population Survey.* Vole sign survey (*Microtus* spp.) was conducted each summer, initially by wildlife technology students and later by Game Division biologists. Six sections were randomly chosen from the inner 36 sections of each study area for the survey. One side of each of these six sections was randomly chosen as the sample transect. Within this transect a 500-foot strip containing good meadow vole habitat was chosen. Ten sample plots (1-sq. ft. size), located at 50-foot intervals were examined for fresh runways, droppings and cuttings and given a rating (Hayne and Thompson 1965).

*Rabbit Population Surveys (Jackrabbits and Cottontails).* Indices of populations of jackrabbits (Drieslein 1966) and cottontails (Lord 1963) were obtained by night-time roadside spotlight counts, conducted each year in May and October by personnel of the Law Enforcement Division. One 50-mile route was established on all-weather roads in each study area on which five census runs were made in each of the two, one-month periods. Route-coverage activity was coordinated so that the five runs were conducted simultaneously on the same five dates on all three areas of a unit. All rabbits observed within the area of effective illumination (approximately 150 feet outwards from each side of vehicle) were recorded.

*Aerial Counts of Active Fox Dens.* Aerial counts of active fox dens each year in May were the responsibility of Wildlife Services and Department of Game, Fish and Parks personnel. Reconnaissance for locating and counting active dens in each 100-square-mile area was done predominately on a transect basis, with the initial transect flown one quarter mile inside each section and subsequent transects spaced at quarter mile intervals. Den locations were recorded on grid maps.

*October Surveys of Fox, Raccoon, Badger and Skunk Dens.* An annual survey of predator dens on small carnivore reduction areas and on check areas was conducted in October by Wildlife Services personnel. Ten sections were randomly chosen per study area and searched in their entirety for dens. Results constituted indices for estimating relative change in population density of each

species between study areas from year to year. Accuracy of this index for foxes was low because of their vague association with dens in the fall of the year.

*Placental Scar and Fetal Counts in Fox Uteri.* Fox uteri were collected from animals taken inside and outside the A and C study areas by mammal control personnel. They were examined by wildlife technology students and Game Division biologists for placental scars or fetuses for determining effect of intensive population control upon fox litter size (fecundity rate).

*Fox Stomach Analysis.* Stomachs of red foxes were collected throughout the study by mammal control personnel. Wildlife technology students analyzed the contents according to volume and frequency of occurrence of the various food items.

*Habitat Evaluation.* A strip one-half-mile wide (1/4-mile outwards from each side of road) along each of the three pheasant census routes per study area was cover-mapped for checking comparability of land use practices and major cover types between study areas. Cover type interspersion was also ascertained for determining whether there were differences in the arrangement or distribution of cover types that may have affected habitat quality between study areas. The survey was conducted by wildlife technology students and Game Division biologists.

*Pheasant Nesting Study.* This supplemental study was limited to small-carnivore-reduction (C) and check (B) areas of Unit 3, and conducted by Game Division biologists as described in Pittman-Robertson study completion report (Carter and Trautman 1973).

The sampling design consisted of eight linear transects per section, each transect extending the full length of the section. Transect No. 1 was located along the east edge; transects 2, 3 and 4 extended progressively westward in the eastern half of the section and were spaced at approximately 40-rod intervals. Transect No. 5 extended through the center of the section; and transects 6, 7 and 8 extended progressively westward in the western half of the section, also spaced at approximately 40-rod intervals.

An alternate nest-censusing technique was simultaneously employed in 1971 to test the reliability of the original method being used. From one to two plots ranging from 1 to 4 acres were randomly selected in sections that were to be sampled. The plots consisted of residual cover or pasture land where nests were least likely to be disturbed, except possibly by predators. The plots were completely searched for nests.

The order in which a section was sampled was determined by the sequence in which its number was selected from a pool containing the numbers of all sections comprising a study area. Annual sample size per study area consisted of the number of sections that could be covered during July.

*Predator Control Questionnaire.* In the final year of study, a questionnaire was mailed to all landowners or their tenants on the three small carnivore reduction areas for determining their reactions to the hazards of intensive predator-control. A follow-up mailing was made to nonrespondents.

*Predator Control Methods.* Fox populations on fox reduction areas were controlled by three Wildlife Services mammal control agents and one Game, Fish

and Parks control agent. Fox control was conducted year round by systematic use of strychnine-treated draw stations in January and February, by aerially locating and gassing active dens in May, with surveillance maintained during other times throughout the year for locating and destroying by gunning and trapping as many as possible of those animals moving in from outside localities. The fox control program was initiated in winter, 1965 and terminated in autumn, 1969.

Fox, raccoon, badger and skunk control on small carnivore reduction areas was conducted by two Department of Game, Fish and Parks mammal control agents by systematic distribution of strychnine-treated eggs throughout each reduction area in March and April, with surveillance maintained during other times in the year for locating and destroying by poisoning, gunning and trapping animals by-passed earlier and those moving in from outside localities. The multi-species control program was started in winter, 1967 and terminated in autumn, 1971.

## **Results and Discussion**

Indices of populations of pheasants, rabbits and small rodents on the fox reduction, small carnivore reduction and associated check areas were compared for evaluating differences in bird, rabbit and small rodent populations between predator reduction and check areas. Similarly, indices relating to population density of small carnivore species were compared for assessing approximate degree of control achieved.

### *Effects of Fox Only Control*

The scheduled five years of study concerning the predation effects of red foxes upon populations of pheasants, rabbits and small rodents was completed in 1969. On the average during the five-year period (1965-1969), approximately 83 percent of each year's fox population was eliminated on the fox control areas. With such intensive fox reduction effort, the annual differences over the period in amounts of change in pheasant, jackrabbit, cottontail and small rodent populations between combined fox control and combined check areas averaged out at 19 percent more pheasants, 136 percent more jackrabbits, 18 percent fewer cottontails and 15 percent more small rodents per year on fox control areas (Table 1, Figure 2). According to these results, fox control was only nominally effective towards maintaining or increasing pheasant populations. This was also the case in a smaller fox-control experiment of similar experimental design in New York (New York State Conservation Department 1951). Excepting jackrabbits, which exhibited irruptive tendencies in their populations up through 1967, no major population effects attributable to fox control were observed in pheasant, cottontail and small rodent population trends. Severe natural fox mortality in 1967 reduced fox populations on the check areas by more than half of their 1965 and 1966 density levels. Although natural reductions in fox numbers of such magnitude are not necessarily uncommon in fox population dynamics, in this case it very likely reduced the effect of artificial control over the "long-term" (five-year) period.

**Table 1.** Average amount per year\* throughout five-year periods that populations were higher (or lower) on predator reduction areas than on check areas.

<b>Prey Species:</b>	<b>Result of Fox Only Control (1965-69)</b>	<b>Result of Fox- Raccoon-Badger- Skunk Control (1967-71)</b>
Pheasants	19% higher	132% higher
Jackrabbits	136% higher	63% higher
Cottontail rabbits	18% lower	50% higher
Small rodents	15% higher	18% higher
<b>Predator Species:</b>		
Foxes	33% lower	33% lower <sup>1</sup>
Badgers		131% difference <sup>2</sup>
Raccoons		82% difference <sup>3</sup>
Skunks		111% difference <sup>4</sup>

\*All differential population gains or losses due to predator control prorated evenly over five-year period.

<sup>1</sup>74% lower on control areas; 41% lower on check areas.

<sup>2</sup>69% lower on control areas; 62% higher on check areas.

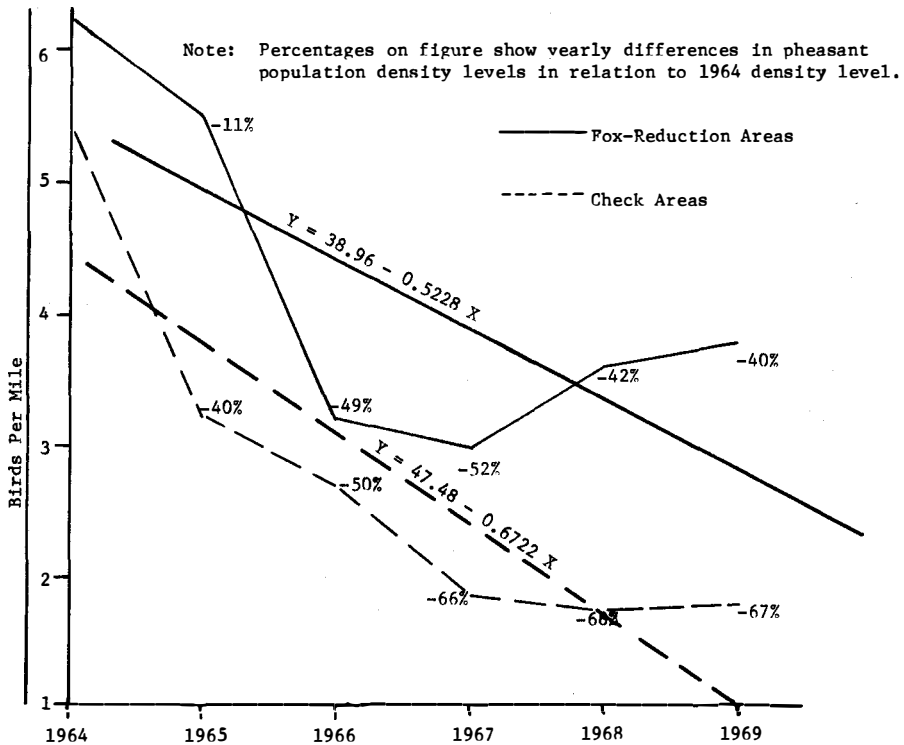
<sup>3</sup>58% lower on control areas; 24% higher on check areas.

<sup>4</sup>66% lower on control areas; 45% higher on check areas.

#### *Effects of Simultaneous Control of Red Foxes, Raccoons, Badgers and Skunks*

Five years of study were completed concerning the effects upon pheasants, rabbits and small rodents through simultaneous control of foxes, raccoons, badgers and skunks. Differences over the five-year period (1967-1971) in the average rates of change in autumn pheasant, jackrabbit, cottontail and small rodent populations between combined predator-control and combined check areas indicated 132, 63, 50 and 18 percent, respectively, larger populations of each of these four prey species per year on the small carnivore reduction areas (Table 1, Figure 3).

At the close of five years of small carnivore control, the overall pheasant population on the reduction areas had more than quadrupled its size (338 percent) in relation to its 1966 pre-predator-control population level, even though study-area populations were reduced by about one-third in 1968-69 winter as a result of storm mortality. For the same period, the overall check-area pheasant population increased by about one-half (53 percent) above its 1966 pre-study population level, or only about one-sixth as much as reduction-area population.

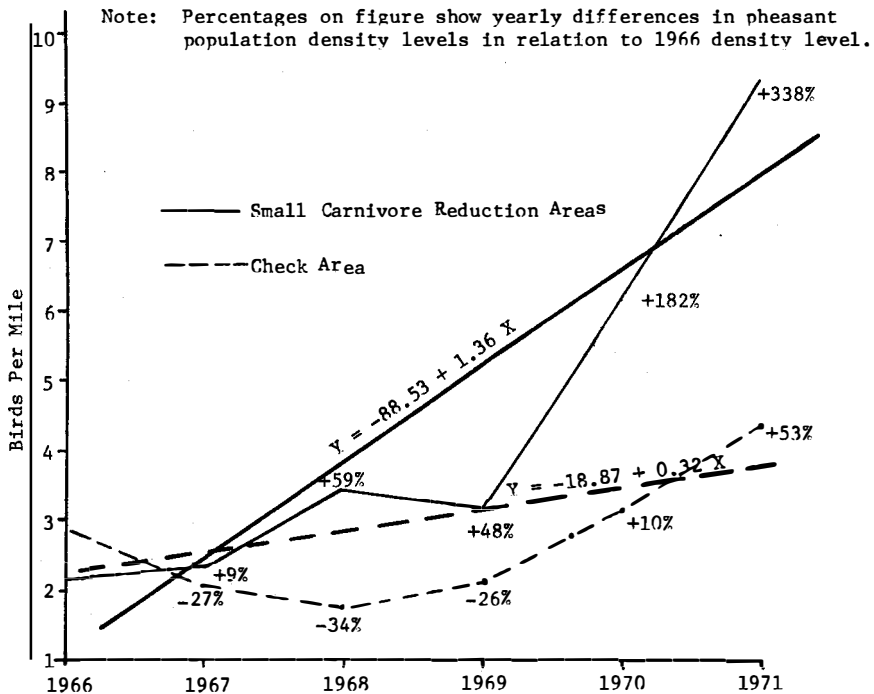


**Figure 2.** Late Summer Pheasant Population Trends on Fox-Reduction Areas and on Check Areas, All Study Units Combined, 1964-1969.

On the average over the five-year period, about 74, 58, 69 and 66 percent, respectively, of the approximately 1.42 foxes, 2.88 raccoons, 1.48 badgers and 2.91 skunks, (or 65 percent of the combined 8.69 animals) per square mile per area were eliminated annually on the small carnivore control areas (Table 1). Relatively, between control and check areas, the amount of reduction resulting to respective raccoon, badger and skunk populations was substantially larger when considering the population increase that occurred to these three mammalian species on check areas during the period—but were prevented on the reduction areas as result of mammal control. Rough estimates of animals killed on the C areas at baited draw stations, during poison-egg campaigns and by trapping and gunning averaged 1.04 foxes, 1.67 raccoons, 1.03 badgers and 1.92 skunks, or 5.66 animals for all four species combined per square mile per area per year over the five-year period. Approximately 65 percent of counted kill was achieved by use of poison (primarily strychnine), 24 percent with traps and 11 percent with guns.

As they relate to pheasants and possibly to other upland, ground nesting game bird species and to waterfowl, predation effects observed in this study appear quite similar to those observed in two Minnesota studies that involved





**Figure 3.** Late Summer Pheasant Population Trends on Combined Fox-Raccoon-Badger-Skunk Reduction Areas and on Combined Check Areas, 1966-1971.

intensive reduction of numerous predator species. In one of these (Chessness *et al.* 1968), pheasant hatching success and brood production was more than doubled, and in the other (Balsler *et al.* 1968), 60 percent more Class I ducklings (broods up to 19 days of age) resulted on the predator control areas.

A study of duck nesting in upland cover in north-central South Dakota revealed that good nesting cover (early successional grass-legume vegetation on idle land) produced more than six times as many ducklings per acre with no predator control, as did poor quality nesting cover (usual vegetation of active agricultural land) with intensive predator control. However, such good quality nesting cover produced more than four times as many ducklings per acre with, than without, intensive predator control (Duebbert and Kantrud 1974). At least 2,029 ducklings (more than 16 per acre) were hatched on one, 125-acre, predator-controlled tract of retired cropland under USDA Cropland Adjustment Program near Hosmer, South Dakota, 1970. Intermediate wheat grass and alfalfa comprised the principal nest cover species (Duebbert, personal communication).

Sargeant (1972) identified remains of 172 adult dabbling ducks (84 percent females) and 16 American coots at 35 red fox dens. Species and sex composition of the ducks found at the dens during early and late sampling periods reflected the nesting chronology of prairie dabbling ducks. Number of adult

ducks per den averaged 1.6, 5.9 and 10.2 in regions with relatively low, moderate and high duck populations, respectively.

Predation accounted for 80.8 percent of all classified deaths among a radio-tagged sample of 244 pheasant hens on Waterloo Wildlife Area, Wisconsin. Among monitored losses to predation, 60.5 percent were attributed to mammalian predators with the red fox implicated in four-fifths of the cases. Habitat improvements applied to Waterloo were apparently ineffectual in offsetting limitations placed on pheasant population density by predation (Dumke and Pils 1973).

#### *Other Study Results*

Average annual representation (1965-1971) of each of the four broad food groups, *i.e.*, mammals, birds, plants and insects, according to frequency of their occurrence among contents of 1,327 fox stomachs, was 87, 46, 40 and 9 percent, respectively. Mice, primarily *Peromyscus* and *Microtus*, and rabbits were the most important mammal items in the diet (occurred in 56 and 38 percent of the stomachs, respectively); grasses comprised the majority of plant occurrences and grasshoppers and beetles essentially all insect occurrences. The occurrence of pheasant remains in 28 percent of the fox stomachs in South Dakota was high compared to 9 percent in Wisconsin (Besadny 1966), and 5 and 4 percent, respectively, among contents of stomachs and intestines collected from red foxes in Iowa (Scott 1950).

Litter sizes according to placental scar counts averaged 4.7 in 1965 at onset of artificial fox population reduction as compared to 7.6 in 1966, 8.1 in 1967, 7.2 in 1968, 8.8 in 1969, 8.0 in 1970 and 6.3 in 1971. The overall average for the 6-year period of intensive control was 7.67 or 63 percent larger than at onset of control in 1965. This substantial increase in litter size indicates that the fox reproductive rate was positively affected by abnormally high mortality brought about by artificial control measures (difference significant at 0.1 level). Compensatory fecundity was also observed in Michigan where red fox litter size was significantly larger in the southern than in the northern portions of the state. The litter-size difference was attributed to variation in environmental capacities and human hunting pressure (Schofield 1958).

Pheasant nesting information from Unit 3, during the 5-year period of small carnivore population control, disclosed very little difference in the relative proportions of nests hatched, and nests destroyed among total nests, between the reduction and check areas (Carter and Trautman 1973). Average hatched-nest percentages for the 5-year period were 21.9 and 20.8, respectively, for the reduction area and the check area, and destroyed-nest percentages of 69.0 and 62.6, respectively, with the balance comprised of low percentages of active and abandoned nests.

However, by the close of the Study, the post-reproduction-season pheasant density level of the reduction area was almost twice as high (195 percent increase) as the 1966 pre-study level. That of the check area was only one-fifth (20 percent) above the 1966 pre-study density level. As a check upon the validity of the nesting data obtained by the regularly used *transect* sampling method, a *random-plots* method was simultaneously used in 1971 which yielded essentially similar results. In view of the large difference in the respective rates

of change in the pheasant populations of the reduction and check areas, it was concluded that the major impact of predator control is primarily related to improved rates of juvenile- and adult-bird survival, rather than to appreciable change in the rate of nest predation.

Results from the land use and habitat evaluation survey revealed that the fox-only study area of Unit 3 contained more Conservation Reserve (Soil Bank) and Cropland Adjustment Program (CAP) acreage than the Unit 3 check area. Otherwise, no appreciable habitat differences were detected between mammal control and check areas of the respective study units.

Among 196 questionnaires submitted to all landowners (or their tenants) residing on the small carnivore reduction areas, 169 (86.2 percent) were completed and returned. Almost all (98 percent) of the farmers expressed a desire for some measure of control of each of the four small carnivore species. Only a low proportion (16 percent) ruled out the possibility, if properly instructed, of doing most of the predator control work on their own land by themselves. Fifty percent favored an intensive county-wide (or range-wide) predator control program. Over two-thirds (69 percent) favored some combination of predator control and habitat improvement as the best program for increasing game bird populations.

The cost of controlling only fox populations for study purposes averaged \$30 per square mile per year, and that for simultaneously controlling fox, raccoon, badger and skunk populations \$41.10. In both operations, the mammal control method used was of the type in which professional mammal-control agents did all the work themselves, *i.e.*, without assistance from non-salaried, nonprofessional personnel.

## Summary

Experimental results indicate that an intensive fox-only predator control program holds small promise as a means of increasing pheasant abundance. Conversely, a multispecies (fox, raccoon, badger and skunk) predator control program should substantially increase pheasant populations, and to a lesser extent, jackrabbit and cottontail numbers. There was no real evidence, however, to indicate that such program would bring about an abnormal change in small rodent populations. Limiting the size of small-carnivore populations by artificial control should not be considered as a substitute for increasing or improving habitat, but as a tool for enhancing the production and carrying-capacity capabilities of existing habitat for pheasants and, very likely, for other upland game birds and waterfowl as well. However, predator control should be objective, preferably to be achieved by the public utilizing the predator species for their traditional value as a fur resource. If such control is ineffectual, then alternative methods that are economically feasible to implement on a large scale would be advisable.

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## Panel Discussion

DISCUSSION LEADER ROBERT A. JANTZEN, Director, Game and Fish Department, Phoenix, Arizona: First, I would like to thank the people on the panel. They did an admirable job.

MR. STEVE JOHNSON [Tucson, Arizona, Southwest Representative, Defenders of Wildlife]: One comment, first, on the initial remark comparing the U. S. to Europe where intensive predator control has been in effect for years. I worry about comparisons like that. Comparing sanitized Europe to portions of the U. S. which are, as yet, relatively free of such "game enhancement," is a little bit scary to me.

Now for the question I had to direct to Samuel Beasom. First of all, it is an excellent presentation. All the presentations were excellent. Mr. Beasom's, in particular, was easy to understand. The areas that you used for your studies, how long had they been free of grazing? Had they been free long enough for the necessary grasses and foods for rodents to come back to the extent that a natural ecosystem was represented?

MR. BEASOM: Neither of the areas was free of grazing. Both were grazed by domestic cattle at approximately the same rate. The vegetation on both study areas was essentially identical. I did a whole series of vegetation assessments prior to selecting the two study areas, trying to have them as similar as possible. But as far as your question goes, there was grazing by cattle.

MR. JOHNSON: Thank you. It would be interesting to see this same study repeated in an area that had been free of grazing for quite some time just to see if there would be any difference.

Now one more question. The final question, I guess, for all three of the presentations, with relation to enhancement of game species through predatory control, is: So what? Suppose you do increase the production of pheasants, which is not an indigenous species. A great many people in today's America value the predator and the natural relationship of the ecosystem at least as equally as game that can be harvested. So what?

DISCUSSION LEADER JANTZEN: Does anybody here care to comment on the

second question or the general comment? We've got some nods "Yes" and some nods "No." I think you probably put your finger on the thing that bothers many people in wildlife management.

MR. BENNETT BROWN [College Station, Texas]: On many of our range lands we have to justify game populations from an economic standpoint. So I want to ask this of Dr. Beasom. I know he put a lot of effort into his predator removal. It required a very intensive effort on his part, much more intensive than the traveling programs of the Wildlife Services people. So I guess what I want to know is: Is it a management tool? Can you justify this intensive predator removal on an economic basis?

MR. BEASOM: This might go a little toward answering the "So what?" we just had. I did an economic assessment of the predator relationship in which I was involved, and I was trying to see if, in fact, it was economically justifiable. This does not mean that it is biologically justifiable, but I wanted to see if it was economically justifiable. There is a lot of question about this fact with most predator relationships.

I arbitrarily assigned a dollar value to the game animals—the turkeys and the deer. I think I was somewhat low in this particular relationship. I assigned a \$100 value to a male white-tailed deer, a \$50 value to a female white-tailed deer and \$50 to a turkey. Based on this relationship, I tried to find out what would be the cost/benefit of such an endeavor. And I looked at this in the different rates of harvest. I thought this was a particularly interesting relationship. If you could harvest 100 percent of the surplus animals that were produced on the experimental predator removal area—in other words, the animals over and above that which were produced on the control area—the net return from this predator removal study would have been \$2.59 per acre. If you could have harvested 50 percent of the surplus, you would have still been in the black. It would have been 67¢ per acre, I believe. But in Texas, most of the harvest rates that we find all over the state, both with turkeys and with deer, are around 10 percent. Under a 10 percent harvest, this study would have been about \$1.25 per acre in the red. So in effect, it was economically justifiable if you could harvest intensively enough.

MR. JOHN KEY [University of California]: Dr. Beasom, you touched on this, but I would like to explore it further.

Do you have any information as to what effect increased fawn survival is having on the deer herd population dynamics? It is not clear to me that such increases in fawn survival would lead to increase in long-term yields of deer. It might if you are willing to harvest those fawns at the end of the summer. But I wonder if the adult herd can support those fawns to a harvestable age of a year and a half and do so year after year.

DR. BEASOM: You are probably right. I don't believe you can maintain this increase in productivity on an area unless you have that harvest. In other words, something is going to control the population. You can't go on producing that many animals on the area without the predators. So the productivity in the area would definitely decrease in time. Unfortunately, you need a long-term study to show this and my data are limited in this respect—only two years. In the second year, however, the density of the herd was substantially increased. I think you are right in assuming that this increase could not go on unless you harvested the animals.

MR. MARK TAYLOR [York University, Ontario, Canada]: I want to question Dr. Trautman. However, I guess it applies to all of the speakers. If one does practice predator removal, does this really make any difference to the number of game animals which can be harvested?

From work done in Scotland on grouse, it has been shown that even without any predator control, there is no way the surplus population can ever be removed in any year. So by predator removal, you don't really change the situation at all with regard to hunting.

DISCUSSION LEADER JANTZEN: You are saying that studies in Scotland show that even with the removal of predators essentially that activity had no effect on the numbers of grouse that could be taken, whether or not you had the removal. Is that correct?

MR. TAYLOR: Yes.

MR. TRAUTMAN: In South Dakota, the pheasant has been traditionally quite important to the state. Originally, when the bird was introduced, it skyrocketed in one of those population irruption affairs. We actually got the reputation of being the Number 1 pheasant state in the nation, and that attracted a large number of hunters and

considerable revenue. When you have a population level in October of six to eight million birds in the state, it is rather attractive as a pheasant hunting country.

Consequently, there is some importance in maintaining a pheasant population in our state that is somewhere within that range of six-to eight million birds. As I said, we have quite a number of game species, but the pheasant has been the principal "cream and butter" species financially. We really cannot turn a blind economic eye to the management of these species. Certainly if we can keep the population up there, they will continue to be harvested in substantially greater numbers by substantially more people. I hope that that answers your question.

MR. TAYLOR: Not really, but I guess we'll let it go.

MR. BILL KEIL [Kingsville, Texas]: I certainly would back up what Mr. Trautman just said.

It seems to me that we all know that natural ecosystems have been upset by man's use of the land, and in the context that a good many of us in the room are wildlife managers, I think we really should consider seriously predator control, removal or whatever you want to call it, as a tool of wildlife management, not a broad policy to be used everywhere. But there are some specific examples of where the control of predators has significantly increased production. These are mostly game species that I am talking about, but they wouldn't necessarily have to be.

One thing that really concerns me these days is the increase of raccoons in the Prairie Pothole Region of North America. These animals are having an impact on diving ducks, such as canvasbacks and redheads, that most of us are concerned about. They are not in very good numerical status.

Another example is in the Lower Rio Grande Valley of Texas and the white-winged dove production. Here is an instance of where their predator, the great-tailed grackle, has been thrown in very close proximity with these colonial nesting birds. Good studies have shown that through grackle control white-wing production can be doubled, and this is a species that is utilized to the maximum right now.

Using predator control carefully as a tool in wildlife management has some good prospects, as opposed to just sitting back, as we tend to do in so many cases, and just charting the decline of a species and putting additional restrictions on the hunter.

DISCUSSION LEADER JANTZEN: Thank you, Bill. Is there any response from any of the gentlemen here?

MR. BYERS: I would like to respond to you and comment that oftentimes what you have said is true. But oftentimes, as well, predation and factors which affect nest predation or predation upon game species are not fully understood. In my particular example in Dewey's Pasture for the three-year period, predation was high at one time, and also, referring back to the data, during nesting success periods it varied from 31 percent to 82 percent. My personal opinion is that the striped skunks weren't that responsible in the changes in nesting success and that the roles of the buffer species were quite evident during this three-year period.

My response is that with more complete understanding of predation, we can perhaps deal more effectively with this problem and perhaps use control programs when we feel it might be necessary and perhaps monitor alternate prey species. When the habitat populations of the buffer species are low, you are perhaps improving the habitat as well. I should point out that we should perhaps improve the habitat to maintain the higher numbers of prey species in addition to control programs. That is my response to your comment.

CHAIRMAN WAGNER: I am not sure how much presumption the chair is entitled to, but I am going to test the water. I will be so presumptuous as to rephrase the question from the gentleman from Canada and rephrase the answer by Mr. Trautman.

Is it the crux of that question that the Scottish studies have shown the red grouse to be essentially self-limiting in terms of population density, and that, in fact, predators really only take a surplus that will disappear anyway? And so the real point is that any kind of predator removal really would not effect any increase in grouse numbers. Isn't that the point, not the question of whether or not an additional number could be produced and whether or not they would be harvested?

MR. TAYLOR: Yes. You are a lot closer now. The point is that the hunting capabilities invoked in shooting grouse are so relatively inefficient so that even if you do increase the

surplus by controlling predators, it doesn't make much difference. There is nothing statistically provable as to the hunting success. That is the point I am trying to make.

CHAIRMAN WAGNER: All right. I will be so presumptuous now as to try to rephrase Mr. Trautman's answer. It seems to me that the situations are different. There is a question of whether or not the grouse populations would be increased at all with predator removal, and secondly, the point you make as to whether or not any possible surplus, even if it could be produced, could be utilized. On the other hand, the pheasant is a different situation. Mr. Trautman's studies and I think some other studies are showing that predation does provide some degree of population reduction on pheasant populations. The implications seem to be, in the nature of pheasant hunting and so forth, that if one could increase the pheasant population substantially there would be a higher bag.

Thereupon, I have assumed all my presumptions.





# The Impact of Uncontrolled Dogs On Wildlife and Livestock<sup>1</sup>

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## Introduction

The origin of the dog (*Canis familiaris*), according to Fox (1973), remains an enigma, but archeological remains of very dog-like Canids date back to 10,000 B.C. Perry and Giles (1970) cited that the domestication of the dog dates back six to eight thousand years. At any rate, the association of a domestic Canid with man is of long standing, in which the natural tendencies and behavior have been bred and exploited for man's objectives, particularly for hunting, but also for protection, companionship, draft, food and scavenging purposes. Fox (1973) theorizes that, in spite of thousands of years of domestication, many dogs still have not lost a number of basic urges, foremost of which include hunting and chasing moving things. When such behavior occurs out of man's control it becomes problematical.

Recently public attention has been focused on the damage to property and injuries to people, livestock, and wildlife caused by stray, feral and uncontrolled companion animals. Companion animals are those normally considered to be pets, namely, dogs and cats (*Felis catus*). Many of the articles which have stimulated this public concern have been sensationalized, scare-type editorials and bread-and-butter columns, but many have been authored by professionally qualified and competent persons as well. Because of the mixture of emotion, opinion and fact in much of the literature, it was felt necessary to try to evaluate the problems, if they exist, caused by these animals on a nationwide basis. Little data, or even rational estimates, have been available on the national distribution and numbers of cats and dogs, or the scope and magnitude of property and animal losses attributable to them. Existing documented reports and the responses to a nationwide survey indicate that the problems are variable, emotional and many times controversial, dependent to a great extent on local circumstances. It may be that the greatest value of this report lies in indicating areas of questionable validity, and pointing out the total lack of documented information on various facets of the problem.

## Procedure

Two copies of a two-page questionnaire were sent to each of the state and territorial departments of agriculture and to the wildlife conservation or natural resource agencies. In addition, a one-page questionnaire was sent to

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<sup>1</sup>The original survey was conducted for The American Humane Association, Denver, Colorado.

<sup>2</sup>Present address: Route 3, Box 459, Golden, Colorado, 80401.

250 members of the American Association of Zoological Parks and Aquariums. In each case a cover letter was enclosed explaining the objectives of the survey, defining the terms used, advising that the second or duplicate copy sent was for the recipient's files, and inquiring if they would like a copy of the completed survey.

The terms, as used in the survey, were defined as follows: "stray" meant unowned animals; "feral" meant existing in a state of nature, having escaped from domestication, or having been born in the wild, and not normally dependent on man, either directly or indirectly, for sustenance (there are probably few truly feral companion animal populations as defined here); and "uncontrolled" meant owned animals which are unrestrained or at large (free-running) for varying periods of time during the day or night (pets).

The first consideration was whether or not the agency or organization felt that uncontrolled dogs and cats constituted a problem, then, if so, to complete with known or estimated figures the seriousness and ranking of damage to people, livestock, wildlife, and other (specify); to pinpoint areas in regard to types of damage and numbers of responsible animals; to designate whether the offending animals were pets, strays or feral in singles, pairs or packs; to indicate the quantity and value of livestock and wildlife damage; to indicate what state agency made restitution for damages, if any, and the authorizing statutes; what agency was empowered to control such animals; and if there was any documentation of hybridization in the wild between dogs and other Canidae.

Inasmuch as zoos represent a more discrete and controlled situation than the other organizations contacted, it was felt that some precise data on the quantity and value of damage sustained could be forthcoming. A single-page questionnaire was sent to them requesting applicable information on the past five-year period.

## **Results and Discussion**

Of the 54 sets of questionnaires sent to state and territorial conservation departments, answers were received from 36 (67 percent). Of the returns 31 (86 percent) indicated that they did consider uncontrolled companion animals as a problem, but five did not answer the question specifically. Damage to wildlife was listed as the first-ranking problem, with deer, small game and birds in decreasing importance. Livestock damage to sheep, cattle, hogs, poultry and goats was of second magnitude. Bites, nuisance and property damage in relation to humans were third-ranking. These damages were reportedly inflicted largely by pets, and generally in packs of three or more. Strays tended to pack up more than pets and feral dogs. Estimated dog populations were advanced by eight departments and indications of livestock and wildlife damage were given for 30 states. These and other data will be discussed in more detail in following sections.

Only 52 percent of the 54 questionnaires sent to state and territorial departments of agriculture were returned. Of the 28 returns, 20 felt that they had a problem with dogs and cats, 3 felt they had no problems, and 5 did not answer the question specifically. These departments felt that damages to livestock (sheep, poultry, cattle, pigs and goats) were of the most impact. Bites,

nuisance and property damage to people were second, and injuries, harassment and death to deer, small game and birds were third. Strays were attributed to forming packs and causing the most damage. Nine states reported some data or estimates on dog and cat populations, and 18 reported livestock and/or wildlife damages. Data on the 18 states reporting compensation for livestock damage by dogs, and the authorized control agency or organization in 22 states are presented in later sections.

A 35 percent return on the 250 forms sent to the members of the American Association of Zoological Parks and Aquariums indicated that almost half of them have problems with strays, in spite of the fact that almost 60 percent of them have relatively pet-proof perimeter or exhibit enclosures. Thirty-five (including aquariums) reported that they did not have problems, due to their locations, the nature of their facilities, or the physical construction of their exhibits. It was felt that more documented data would be available from zoos and similar installations due to the relatively high cost and rarity of some of their animals, but such was not the case, for surprisingly few of them actually had records of such damages, resultant veterinary costs, etc. A total of 168 dogs were participants in 92 incidents, in which 61 cases resulted in exhibit animal damages or losses. Sixty-eight cats were involved in 27 of the 52 cat incidents reported. Zoo animal losses were valued as at least \$75,070 during the past five years, and involved a minimum of 892 exotic animals. Veterinary treatment of injuries in 44 cases cost \$2,142.50 in addition to 77 injury cases where no medical costs were listed. Many of the larger animals treated died later, and most birds and small mammals that survived initial attacks subsequently died. Cooperation with or by local humane societies or animal control organizations was reported as good by 46 of the zoos. Forty-two zoos caught 950 dogs, and 29 caught 487 cats, during the past five years. Forty per cent captured by finesse, 40 percent used livetraps, and 21 percent used chokesticks in the capture of strays on their premises. Captured animals were turned over to animal control agencies by 43 percent of the zoos, to local humane societies or SPCA's by 33 percent, 14 percent euthanized the captives, and 10 percent returned them to their owners or adopted them to employees.

### *Human-related Damages*

One of the first dangers to come to mind from dogs is that of bites and the attendant possible transmission of rabies. In responses from state conservation and state agricultural agencies the human-related dog damages ranked third behind wildlife and livestock (Table 1). Specific physical contact or injury was indicated by a total of 29 references to bites, rabies, attack, assault and harassment on persons, in many cases children. Bite cases reported for portions of 17 states by humane and animal control groups totalled 42,580 (Table 2). Katz (1973) credited Beck's (1973) research as indicating that there are more than 1.4 million dog-bite victims per year year nationally. Beck found that the number of bites in Baltimore increased 54.3 percent even though the dog population increased only 20 percent and the human population decreased during the period 1960-70. It is estimated that only about half that city's bites are reported, and the situation is even more uncertain in the rest of the country. In one year, from 1971 to 1972, dog bites increased over 21

**Table 1. Summary of some answers to an uncontrolled dog questionnaire sent to state departments of agriculture and state conservation agencies, 1973.**

State Agency	Dogs a Problem?		Rank, Number and Value of Dog Damage Incidents per Year				Types of Dogs	Damage Compensation Agency	Animal Control Authority
	Yes	No	Human	Livestock	Wildlife	Other			
Alabama Conservation	X				1) Harrass and kill young, destroy nests on ground			None	None
Alaska Conservation	X				1) Kill 25-30 deer per yr in southeast in spring		Pairs and packs	None	State Troopers
Arkansas Agriculture	X		1) Bites	2) Horses \$2500, poultry \$600	3) Kill 200 deer		93% pets, 7% feral	None	Municipal
California Conservation	X		3) Rabies, nuisance	1) Cattle, sheep, poultry totaling \$13000	2) Kill many deer		Single pets & strays, pairs and packs feral	None	Agriculture
Colorado Agriculture	X		3) Bites	2) Livestock, poultry	1) Kill deer			None	Agriculture Conservation
Colorado Conservation	X		3) Bites	2) Sheep \$400, cattle	1) Kill 314 deer, 30 elk, 4 big-horns, upland game		70% pets, 25% strays, 5% feral	None	Conservation

Table 1. (Continued)

State Agency	Dogs a Problem?		Rank, Number and Value of Dog Damage Incidents per Year				Types of Dogs	Damage Compensation Agency	Animal Control Authority
	Yes	No	Human	Livestock	Wildlife	Other			
Connecticut Agriculture	X		1) Bites, roaming	2) 1000 sheep, 2 cattle, 25 goats, 150 poultry, 200 rabbits, \$5561	3) Deer, 27 known, 270 est. small game		Mostly pets	Agri.	Agriculture
Conservation	X		1) Bites, roaming	2) Same as above	3) Same as above *		85-90% pets, 2% feral	Agri.	Agriculture
Delaware Conservation	X		1) Nuisance	3) 25 pigs, 40 cattle, 1000 chickens, tot. \$1350	2) Kill game, break up nests		60% strays in pairs	Cons.	Conservation
Florida Agriculture				No substantive data					Counties
Georgia Conservation	X		3) Bites, nuisance	2) 5000 cattle, 2000 hogs, tot. \$700000	1) 3500 deer, value \$145000, rabbits	4) Poultry	50-75% pets	None	Public Health Conservation Counties
Guam Agriculture	X		1) Bites	2)	3)		Strays and pets	None	Public Health

\*Estimate that some of the 450 deer killed per year on highways are driven onto the roads by dogs.

Table 1. (Continued)

State Agency	Dogs a Problem?		Rank, Number and Value of Dog Damage Incidents per Year				Types of Dogs	Damage Compensation Agency	Animal Control Authority
	Yes	No	Human	Livestock	Wildlife	Other			
Hawaii									
Agriculture	X		1) Bites, property	2) 2000 poultry, 150 pigs, 20 cattle			Single pets	None	Humane Society
Conservation	X		3) Bites	1) 100 sheep, 200 goats, 500 pigs	2) 100 deer		80% feral packs	None	Humane Society
Idaho									
Agriculture	X			1) 200 sheep \$6000			Mostly pets	None	Counties
Conservation	X		3)	2) Sheep, cattle, goats	1) Deer, birds			None	Conservation
Illinois									
Agriculture	X		2)	3)	1)			Counties	Counties
Conservation	X				**		Farm dogs		Counties
Indiana									
Conservation	X			2) Cattle, sheep	1) Kill young, destroy nests			Municipal	
Kansas									
Agriculture	X		4) Bites	1) Sheep, cattle, swine total \$110000	2) 5000 deer	3) Nuisance	Mostly pets, singles and pairs	None	
Conservation	X		3) Nuisance, rabies	1) Poultry, pigs, sheep, cattle	2) Deer (25 known, est. several 100)			None	Conservation

\*\*Damage by farm dogs following mowing and harvesting machinery as much as from stray or feral dogs.

Table 1. (Continued)

State Agency	Dogs a Problem?		Rank, Number and Value of Dog Damage Incidents per Year				Types of Dogs	Damage Compensation Agency	Animal Control Authority
	Yes	No	Human	Livestock	Wildlife	Other			
Louisiana Conservation	X			2) Kill young	1) Kill pregnant does and fawns			None	None
Maine Conservation	X			2) 256 sheep, 17 cattle (1971-72)	1) Kill deer in the winter, 131 in 1972, 133 in 1973			Agri.	Agriculture
Michigan Agriculture	X		1) Bites, property	3) Kill and injure stock	2) Kill game			Counties	Counties
Conservation	X		3) Bites	2) Kill sheep	1) Est. 1500 deer killed			Counties	Agriculture
Minnesota Conservation	X			2) Kill sheep	1) Kill deer in winter		Strays in pairs and packs	None	Conservation
Mississippi Agriculture	X		3)	1)	2)		80% strays in packs	None	None
Conservation	X		3) Bites, disturb	2) Kill cattle, goats	1) Est. 500 deer killed			None	Conservation

**Table 1.** (Continued)

State Agency	Dogs a Problem?		Rank, Number and Value of Dog Damage Incidents per Year				Types of Dogs	Damage Compensation Agency	Animal Control Authority
	Yes	No	Human	Livestock	Wildlife	Other			
Missouri Conservation	X		3) Bites, nuisance	1) Kill sheep	2) Kill deer, turkey, small game	4) Lawns, nuisance		None	Municipal
Montana Conservation				No substantive data					
Nebraska Conservation	X			2) Kill sheep	1) Kill deer, pheasant, quail		Mostly strays in packs, no feral dogs	None	Not Known
Nevada Agriculture		X						None	Agriculture Public Health Municipal
Nevada Conservation	X			2) Kill sheep	1) Kill deer, geese		Strays and feral in pairs & packs	None	Counties Municipal
New Hampshire Conservation	X		3) Nuisance, gardens	2) Est. 50 sheep, 10 pigs, 2 horses, 100 fowl killed	1) 150 deer known est. 500-1000; pheasants, small game, 1000		Pet and stray packs, single feral	Municipal	Conservation



**Table 1.** (Continued)

State Agency	Dogs a Problem?		Rank, Number and Value of Dog Damage Incidents per Year				Types of Dogs	Damage Compensation Agency	Animal Control Authority
	Yes	No	Human	Livestock	Wildlife	Other			
New Jersey Agriculture Conservation	X		3) Bites	2) Kill sheep, chickens	1) 50-200 deer, rabbits, pheasants		Strays & feral in packs	Municipal Agri.	Public Health Municipal
New Mexico Agriculture			3) Harass	1) 97 cattle, 66 sheep, 26 hogs, tot. \$12100	2) 3 deer known		Mostly strays in packs		Conservation
Conservation	X							None	Municipal
New York Agriculture	X		3) Bites	1) 15,258 dom. animals and poultry injured or killed in '72 tot. \$183,605***	2) 1971-72 deer kill high in Adirondacks	4) Shrubs, trees, flowers, gardens	Mostly stray packs	Counties	Agriculture Counties Municipal
North Carolina Agriculture Conservation	X X				1) 1000 deer, quail and rabbits in the thousands, 100 turkey nests		Mostly pets in pairs	Counties None	Counties Counties

**Table 1.** (Continued)

State Agency	Dogs a Problem?		Rank, Number and Value of Dog Damage Incidents per Year				Types of Dogs	Damage Compensation Agency	Animal Control Authority
	Yes	No	Human	Livestock	Wildlife	Other			
North Dakota Agriculture		X		Some					
Ohio Agriculture	X		1) Bites	2) Kill sheep, turkeys	3)		Counties	Counties	
Oregon Agriculture	X		2) Bites	1) Damage	3) Game, song-birds			Counties	
Pennsylvania Agriculture	X		3) Bites	1) Kill sheep, poultry, tot. \$34,917.98	2) Kill deer, rabbits		80% strays	Agri. Agriculture	
Conservation	X		3) Bites	2) Kill sheep, poultry	1) 656 deer known, rabbits		75% pets 5% feral singles	Agri. Agriculture	
Samoa Agriculture		X						Public Health	
South Carolina Conservation	X			2) Kill cattle	1) Kill young, destroy nests		Stray and feral packs	None	

Table 1. (Continued)

State Agency	Dogs a Problem?		Rank, Number and Value of Dog Damage Incidents per Year				Types of Dogs	Damage Compensation Agency	Animal Control Authority
	Yes	No	Human	Livestock	Wildlife	Other			
South Dakota Agriculture	X		3) Rabies	1) 200 cattle, 4800 sheep, 300 hogs, 5400 chickens, tot. \$130,000	2) Kill game				
Tennessee Conservation	X		4) Bites	2) Kill pigs, fowl, sheep, cattle, goats	1) Kill deer, rabbits, squirrels, ground-nesting birds	3) Gardens, lawns, shrubby	90% pets 1% feral	None	None
Utah Conservation	X		3) Bites	2) Kill sheep	1) 48 deer known, 390 est.; 144 small game known, 285 est.		45% (most) pet packs	None	Conservation Humane Society
Vermont Conservation	X			2) 150 sheep known \$6000, cattle	1) 1000 deer known avg.		72% pets 3% feral	Municipal	Conservation
Virgin Islands Agriculture	X			1) Goats and sheep tot. \$5000; cattle			80% stray packs	None	Agriculture

**Table 1.** (Continued)

State Agency	Dogs a Problem?		Rank, Number and Value of Dog Damage Incidents per Year				Types of Dogs	Damage Compensation Agency	Animal Control Authority
	Yes	No	Human	Livestock	Wildlife	Other			
Virginia Agriculture Conservation	X		Bites	1) Kill sheep, cattle	100 deer avg. rabbits, ground-nesting birds			Counties Counties	Counties Municipal
West Virginia Agriculture	X		2) Rabies, garbage, plants	1) Kill sheep	3) (Rabbits, quail and birds by cats)		Town pets, rural strays	Counties	Counties
Conservation	X		3) Rabies, garbage, plants	2) Kill sheep	1) 74 deer known, (rabbits, quail and birds by cats)		Mostly pets	Counties	Counties
Washington Agriculture	X		2)	1) Stock \$200,000, farm pheasants \$50,000***	1)	3)	72% strays	None	Humane Society
Wyoming Conservation								None	Conservation
Totals or Ranking	39	4	1) 8 2) 4 3) 20 4) 2	1) 15 2) 26 3) 3	1) 25 2) 12 3) 7	1) 0 2) 0 3) 3 4) 3	1) Pets 2) Strays 3) Feral	1) Counties 2) Agri. 3) Munic. 4) Cons.	1) Counties 2) Cons. 3) Agri. 4) Munic.

\*\*\*Statutes set maximum values on stock injured or killed by dogs.

**Table 2. Dog population, density and bite case information derived from a nationwide mail survey, 1973.**

State	Area to Which Data Apply	Population Estimate	Number Per Square Mile	Bite Cases Per Year	Reporting Organization
Alaska	Juneau area (3,100 mi <sup>2</sup> )	5,000	1.3		Humane
Arkansas	Statewide	240,000 (100,000 cats)			Agriculture
California	San Mateo County (3,100 mi <sup>2</sup> )	90,000 (90,000 cats)	300		Humane
	Cities of Pomona, Claremont, LaVerne, San Dimas (51 mi <sup>2</sup> )	32,000	627		Humane
	Burbank (17 mi <sup>2</sup> )			73	An. Contr.
	Humboldt County			576	S.P.C.A.
Colorado	Vail, Aspen, Boulder, Steamboat Springs areas (2,500 mi <sup>2</sup> )	3,626	1.5		Conservation
	Colorado Springs area (114 mi <sup>2</sup> )	50,000	438		Humane
	Wheatridge (9 mi <sup>2</sup> )	12,000 (12,000 cats)	1,333	125	An. Contr.
	LaPlata County			25	Humane
Connecticut	Statewide (5,009 mi <sup>2</sup> )	Known 8,537 Est. 23,000	2.0 4.6		Conservation
Delaware	Statewide (2,057 mi <sup>2</sup> )	90,000	48		Conservation
Florida	Jacksonville (840 mi <sup>2</sup> )	200,000 (200,000 cats)	240		Humane
	Orange County (250 mi <sup>2</sup> )			2,250	An. Contr.
	St. Augustine			326	Humane

**Table 2.** (Continued)

State	Area to Which Data Apply	Population Estimate	Number Per Square Mile	Bite Cases Per Year	Reporting Organization
Georgia	Statewide	300,000 (200,000 cats)			Conservation
	Savannah (50 mi <sup>2</sup> )	25,000 (20,000 cats)	500	103	Humane
	Chattahoochee Valley (900 mi <sup>2</sup> )	76,000 (30,000 cats)	84		Humane
Guam	Territory wide (212 mi <sup>2</sup> )	11,000 (20,000 cats)	52		Agriculture
Hawaii	Honolulu (607 mi <sup>2</sup> )	54,000 (80,000 cats)	90		Humane and Agriculture
Illinois	Belleville area			365	Humane
	Wood River area			500	Humane
Indiana	Grant County (426 mi <sup>2</sup> )	84,000	20	48	Humane
	Calumet (27 mi <sup>2</sup> )			672	Humane
Kansas	Statewide	35,000	0.4		Agriculture
Massachusetts	Boston (47 mi <sup>2</sup> )	65,000	1,383	1,483	An. Res. L.
	Greenfield (21 mi <sup>2</sup> )	2,000	95	97	Humane
Minnesota	Lansing (5 mi <sup>2</sup> )	25	5	5	Humane
	Mankato			3	Humane
Missouri	St. Louis (90 mi <sup>2</sup> )	25,000	278		Humane
	St. Louis County (520 mi <sup>2</sup> )	50,000	96		Humane
Nebraska	Omaha (15 mi <sup>2</sup> )	4,000	267	1,863	Humane
New Hampshire	Three areas of 1,400 mi <sup>2</sup>	50,000	36		Conservation

Table 2. (Continued)

State	Area to Which Data Apply	Population Estimate	Number Per Square Mile	Bite Cases Per Year	Reporting Organization
New Jersey	Burlington, Camden, Cloucester Counties (1,369 mi <sup>2</sup> )	10,000 (300 cats)	7		Humane
New Mexico	200 mi <sup>2</sup> damage area Las Cruces	132	0.7	15	Agriculture Humane
New York	Statewide (less N.Y.C.)	1,500,000			Agriculture
	New York City			29,678	A.S.P.C.A.
	Saratoga County			316	Humane
	Westchester			72	Humane
North Carolina	Statewide	1,000,000			Conservation
	Orange County (100 mi <sup>2</sup> )	100	1.0		Humane
	Durham			359	Humane
Ohio	Clark County (412 mi <sup>2</sup> )	24,300	59	926	Humane
	Cleveland (County)	170,000			Humane
Oregon	Marion County (1,175 mi <sup>2</sup> )	53,000	45	191	Humane
Pennsylvania	4 counties (2,910 mi <sup>2</sup> )	Known 45,819	16		Agriculture
	Reading (10 mi <sup>2</sup> )	800 (4,000 cats)	80	432	Humane
	Berk's County (862 mi <sup>2</sup> )	68,000 (136,000 cats)	6		Humane
	Philadelphia (130 mi <sup>2</sup> )	100,000 (200,000 cats)	770	707	W.S.P.C.A.

**Table 2.** (Continued)

State	Area to Which Data Apply	Population Estimate	Number Per Square Mile	Bite Cases Per Year	Reporting Organization
Texas	Kerville County (1,000 mi <sup>2</sup> )	13,172 (20,454 cats)	13		Humane
	Grayson County	31,000 (20,000 cats)			Humane
Virgin Islands	All three islands	25,000 (12,000 cats)			Agriculture
Washington	10,000 mi <sup>2</sup> area	5,600 (4,000 cats)	0.6		Agriculture
	Clark County (633 mi <sup>2</sup> )	8,800	14	320	Humane
	Clallam County	3,000		49	Humane
	Benton County			89	Humane
Wisconsin	Watertown			70	Humane
	Milwaukee			842	Humane
Total		4,585,374 dogs (1,148,754 cats)		42,580	
Mean			197.4		



percent in Boston (Carden 1973). Just last summer a pack of 15 dogs on the outskirts of Laramie, Wyoming, attacked and bit three adults and three children. One of the boys had over 200 bites on his body, resulting in severe lacerations and requiring intensive care. Two boys underwent surgery as a result of the lacerations (Denver Post 1973).

Though the incidence of rabies has been reduced in dogs through vaccination since World War II, it is one of the major wildlife epizootics, having increased 34 percent during 1971, primarily in skunks (*Mephites* spp.), foxes (*Vulpes* spp.) and bats (Special Report 1972).

Another aspect of human-related dog damages reported by respondents to the survey had more bearing on general public welfare, such as the nuisance values of disturbance, roaming and getting into garbage. Property damage was cited in 15 instances, including garbage, lawns, gardens, flowers, shrubs and trees. Urine in direct application has been proven to kill the bark on trees in other studies cited by Beck (1973). It is undoubtedly true that much of the nuisance value attributed to dogs in relation to property damage had to do with feces on schoolgrounds, parks and sidewalks, the presence of which on the latter is blamed by some for having killed the "Maxie" skirt style.

It is interesting that none of the survey forms contained any references to public health hazards other than rabies. Some 65 diseases are known to be transmissible from dogs to man, including diseases from viruses, rickettsia, bacteria, fungi, protozoa, nematoda, cestoda and arthropoda, not all of which involve fecal contact (Beck 1973). The incidence of the disease visceral larva migrans, which is introduced to man by the ingestion of the eggs of *Toxocara canis* from dog feces, has been reported by Beck (1973), Drake (1973), Fox (1973) and Djerassi *et al.* (1973). A similar parasitic infection of a tapeworm, *Echinococcus* sp., in man, was the reason for the banning of all dogs from the capitol of Iceland, Reykjavik (Fox 1973).

Beck (1973) reported estimates of up to 20,000 tons of feces deposited by New York City's half million dogs annually, and up to 4,000 tons per year in Baltimore by its 100,000 dogs. He feels that New York's estimate of urine output is far too low at one million gallons per year, and has calculated that Baltimore received 18,720 gallons of urine per day. Dogs deposit approximately 3,500 tons of feces and 9 million gallons of urine per day in the United States (Djerassi *et al.* 1973). Other public health hazards include the increased numbers of flies and rats (*Rattus norvegicus*) directly attributable to the increased availability of garbage strewn from tipped over containers (Beck 1973).

According to Djerassi *et al.* (1973), the annual cost in the United States of rabies control, dog bite care, sanitation, and public health care related to pet-borne diseases amounts to at least \$50 million.

#### *Livestock Damage*

Survey form response from state agriculture and wildlife agencies ranked livestock damages as second in importance; however, from an economic standpoint they rank the highest. Inasmuch as the opinions, estimates and actual data on injury and loss numbers, as well as the values, in the questionnaire returns were not equitable or comparable between states and agencies, a certain amount of interpolation was necessary. Almost 58,000 animals, composed of sheep, poultry, goats, pigs, rabbits, cattle and horses in decreasing incidence,

were reported killed by the 28 agriculture departments responding. A great many of the sheep killed were lambs, and most of the cattle were calves. It is assumed that some mortalities were experienced from harassment of prey species by dogs rather than outright killing, as well as from necessary euthanasia of animals, such as horses, which may have suffered injuries and lacerations due to stampeding through fences or into obstacles.

In spite of their lower incidence, cattle represented the highest losses monetarily in the returns, followed by sheep. The aggregate losses represented for all classes of livestock in the survey responses from 28 states totalled over 2.5 million dollars. This is a sizable loss figure in itself to be inflicted upon stockmen, and may represent only the visible portion of the iceberg. An example comes from the Georgia conservation return, which estimated the loss of 5,000 head of cattle and 2,000 hogs at \$500,000 and \$200,000, respectively. The value of weight losses suffered by cattle and decreased milk production of dairy herds resulting from being run or otherwise harassed by dogs is inestimable.

With the federal ban on the use of toxicants in predator control, dogs may be playing a more dominant role in livestock damages, as illustrated in the Congressional Record (1973: S-8564-5), in which Senator James McClure pleaded for control of coyote (*Canis latrans*) and feral dog populations which have "wrought terrible damage on the sheep ranches of Idaho, Wyoming, Nevada, Montana and Utah." He further cites cases where ranchers have been forced out of the sheep-raising business by losses from predators and dogs, and that the USDA Beltsville Agriculture Research Center has experienced considerable sheep kills during the past two years, including the wipe-out of an entire experimental herd of purebred sheep, by wild dogs.

Wohld (1973) reported on the indications in Oregon that man's best friend may rival the coyote as the number one predator of sheep in some areas, and that the problem appears to be getting worse. This is, in part, attributed to increased numbers of families and their pets moving into the country to live, and the killing is not just done by strays, but has been traced to dogs coming from good homes.

A spokesman for the California Turkey Federation told a Senate Commerce Committee hearing that his group feared the feral dog more than the coyote and other wild predators. Djerassi *et al.* (1973) conjectured that costs from cattle losses and wild dog control must amount to over \$5 million annually.

There seems to be a tendency to classify all uncontrolled dogs, whether they are pets or strays, and particularly if they are seen in packs, as wild or feral animals. There is also the probability that some of the predation by one or two dogs may be attributed to certain wildlife species, *i.e.* the coyote.

Most state statutes provide the authorization for marauding dogs to be killed or captured when observed in the act of harassing or killing livestock, captive wild animals, and poultry, without any liability connected to the person so doing. Likewise, most states provide that the owner(s) of such dogs inflicting damage, injury or losses upon the property of another are liable for the value of such damage, if such owners can be determined. In the event that the owners are unknown, or unable to pay the damages, state laws in at least 18 states provide for the indemnification to stockmen for damages done by dogs (Table 3).

**Table 3. Livestock indemnification data (fund source, setting of values and limits) for 18 states known to compensate owners for damages by dogs.**

State	Source of Funds	Livestock Covered	Value and/or Limits
Connecticut	City Dog Fund	Sheep, goats, horses, cattle, poultry and domestic rabbits	Agreement by city administrative officer and claimant, or above with disinterested third person.
Delaware	Conservation Agency	Indicated on survey form, but not documented	
Illinois	County Animal Control Fund	Sheep and goats Cattle Horses and mules Swine Turkeys Other poultry	Appraisal by County Commissioner and two witnesses, not to exceed: \$15 each \$150 each Plus 50% \$100 each each on \$25 each certified \$5 each registry \$1 each
Indiana	Township Dog Fund or State Dog Account	Sheep, cattle, horses, swine, goats, mules, chickens, turkeys, ducks, guineas, tame rabbits, game birds and animals in captivity by permit	Up to actual cash value on appraisal by claimant and two disinterested persons
Maine	Department of Agriculture	Any livestock, poultry, domestic rabbits	Appraisal of actual value by a municipal officer
*Massachusetts	County Dog Fund	Livestock, fowls, wildlife in captivity by permit	Fair market value appraised by a police officer, chairman or selectman; if over \$50, one of above plus two others

**Table 3.** (Continued)

State	Source of Funds	Livestock Covered	Value and/or Limits
Michigan	County General Fund	Any livestock and poultry	Appraisal by a justice of the peace
New Hampshire	City Dog Fund	Indicated on survey form, but not documented	
New Jersey	City Dog Tax	Sheep, lambs, domestic animals, poultry	Appraisal by claimant and two disinterested persons
New York	County Treasury	Domestic animals Cattle and horses Other domestic animals Fowl, ducks, geese, turkeys, pheasant, hares and rabbits	Appraisal by one or more city assessors, actual value not to exceed (each): \$200 (\$300 for registered cattle) \$75 (\$150 for registered sheep) \$10
North Carolina	County Dog Fund	Indicated on survey form, but not documented	
Ohio	County Dog and Kennel Fund	Horses, cattle, sheep, swine, mules, goats, domestic rabbits, poultry or fowls	Appraisal by claimant and two witnesses of results of killing or injury
Pennsylvania	Department of Agriculture	Any livestock, poultry, domestic game bird	Appraisal by Department of Agriculture appraiser
*Texas	County Dog Fund	Sheep, goats, calves, other domestic animals and fowls	Determination by County Commissioners Court (Act valid only if passed by voters of the county)

**Table 3. (Continued)**

State	Source of Funds	Livestock Covered	Value and/or Limits
Vermont	City Dog Fund	Indicated on survey form, but not documented	
Virginia	County Dog Fund	Indicated on survey form, but not documented	
*Washington	County Dog License Fund	Domestic animals and poultry Horses and mules Cattle Sheep, goats, swine Turkeys Other poultry Rabbits	Appraisal by at least two sworn witnesses, not to exceed (each): \$75 (\$150 if registered) \$50 (\$100 if registered) \$12.50 (\$25 if registered) \$4 (\$8 if accredited) \$1.50 (\$3 if accredited) \$1.50 (\$3 if registered)
West Virginia	Special County Fund	Sheep, lambs, goats, kids, poultry	Appraisal by three persons summoned by justices of the peace or notaries public. Claimant must prove claim before County Court

\*Not indicated specifically for indemnification on survey form response.

Most states providing for the restitution of damages to stockmen allow fair or market values, but three states (Illinois, New York and Washington) accept appraisals up to specified limits for grade or unregistered animals, with an increased ceiling of 50 to 100 percent more if the animals are registered or accredited. The funds for indemnification payments are generally derived from municipal or county dog license or tax fees. If such funds are insufficient to honor all damage claims, the available monies are usually granted pro rata to the claimants, or subsidized by specially appropriated funds through such state agencies as the departments of Agriculture. In many cases, after awarding or payment of damage claims, states or political subdivisions have the right through civil action to attempt to extract the amount of the damage payments from the owners of the offending dogs.

Based on the available information, then, the impact of uncontrolled dogs on livestock is of considerable magnitude, apparently in excess of \$5 million per year. Such losses are not only an unnecessary waste, but undoubtedly trigger and generate additional damages.

### *Wildlife Damage*

The impact of uncontrolled dogs on wildlife is undoubtedly an area of least documentation and most controversy. The combined returns of the state agricultural and state conservation agencies (Table 1) rank dog damage to wildlife as number one. Over 20 thousand deer were reported killed in 32 states, based on adjusted estimates from known kills and on opinion estimates. Other wildlife species reported killed were elk (*Cervus canadensis*) (Colorado), bighorn sheep (*Ovis canadensis*) (Colorado), turkey, waterfowl (up to 75 percent of the annual goose production in the Washoe Lake area of Nevada), pheasant, quail, rabbits, other small game, rodents, and songbirds (the latter two primarily by cats). The destruction of ground nests was specifically reported by six states.

Virtually all of the known documented investigations into wildlife depredation by dogs have been conducted in the southeastern and northeastern United States (Barick 1969; Bland 1968; Cochran 1967; Corbett *et al.*, 1971; Gavitt 1973; Gilbert 1971; Gipson 1972; Jackson 1971; Marchinton *et al.* 1970; Morrison 1968; Perry and Giles 1970; Smith 1966; and Sweeney *et al.* 1971). The scope and intensity of these studies on white-tailed deer (*Odocoileus virginianus*) have not been necessarily comparable, and the results and conclusions have been dependent on local situations, but they do represent an assessment of the problems, if they exist, in specific areas.

In a three-year study of deer mortality in the Malone township of New York, Jackson (1971) attributed 3 percent to dogs, with dogs being responsible for a portion of the 10 percent mortality due to unknown causes. A seven-year study in Rhode Island disclosed that a similar 3 percent of the known deer mortality was caused by dogs. Gilbert (1971) found that 8 percent of the known deer losses (other than legal kill) in Maine in 1970 was caused by dogs. He felt that this was a lower percentage than usual in that in this year of the highest mortality in Maine's history there were large increases in illegal hunting, crop protection and vehicle mortalities.

The Cumberland Plateau of West Virginia was described as having abundant

dogs and a more acute problem from them than anywhere else by Smith (1966). By breeding at will and raising their young in the woods they constitute a menace to deer through harassment and predation, taking a heavy toll of deer and inhibiting the increase and spread of deer in this region. He blamed the dog problem on public apathy for the dog laws, and termed the dog, in effect, the "Sacred Cow" of Appalachia.

It is possible that interest in the Southeast was also stimulated by an article by Morrison (1968) about a 17,000 acre game management area in Georgia. In an 89-day period, the area manager recorded 55 separate chases of deer by a total of 115 dogs resulting in five known kills.

Barick (1969), in a survey of wildlife management areas in 10 southeastern states found that predation by free-running dogs accounted for 6 percent of the annual drain on deer. Even though some claim that dogs only kill fawns, pregnant does, wounded animals or those incapacitated by disease or parasites, he found too many reliable reports of observed kills of healthy deer to discount the dog as a predator, and felt that many deaths by car, train, fence, drowning and cold water shock can be attributed to chasing by dogs. He further calculated an average potential loss of 37 deer per year per 15,000 acres.

Much of the dog/deer relationships interest in the Southeast logically stems from the traditional hunting of whitetails using dogs, which is legal in all or parts of the 10 southeastern states, as well as California (Marchinton *et al.* 1970). Studies of 57 different radio-equipped deer in Alabama, Florida, Georgia and South Carolina by Marchinton *et al.* (1970) did not support the contention that dogs are in any way a limiting factor on deer populations in the study areas. None of the instrumented deer was caught by dogs, nor were there evidences of detrimental effects from being chased. Additional studies of radio-monitored deer chased by hunting dogs were conducted by Sweeney *et al.* (1971) on three study areas located in Alabama, Florida and South Carolina. The deer escaped the hounds in every chase, and returned to their home ranges in one day or sooner. The deer utilized swamps and other bodies of water for escape when available.

In a study of deer-related dog activity in Virginia, Perry and Giles (1970) and Perry (1970) found that free-running dogs may present less of a problem in eastern Virginia than in western Virginia due to the physiography of the region, and, while dogs may be a serious mortality factor in deer stocking programs or in areas of low deer numbers, they do not represent a significant factor in influencing deer population dynamics statewide.

Barick (1969) found that North Carolina data indicated that predation of deer by dogs reached significant levels only in the western mountain section of the state. Studies on radio-equipped deer in this mountainous habitat by Corbett *et al.* (1971) indicated no mortality that could be related to the effects of the dogs during hunting seasons in which dogs were used to hunt deer. Three cases of mortality in instrumented deer, and two noninstrumented deer, did occur and were attributed to dogs. They reported that the results of this study differed from those in coastal plain habitats in that escape routes were more predictable in the mountains, the deer suffered some injury during chases as a result of the rugged terrain, it took longer for them to return to their home ranges, and mortality did result as a direct result of dog chases.

The influence of deer chasing by dogs on pregnant does and on changing home ranges was studied recently by Gavitt (1973) on a 2,040-acre chain-link enclosed area in Virginia. During the first year of investigation, part of the area was used as a control area, while trained deer hounds were used in the other area to chase deer. During the second year hounds and nonhounds were used to chase deer throughout the entire area. No significant differences in fawns per doe surviving to late summer censuses were found between chased and non-chased deer. Though temporary home range changes were observed, no permanent changes were noted. Gavitt's conclusions were that dogs were not detrimental to this densely populated study herd in affecting reproductive potential, inducing permanent home range changes or in killing individual deer.

Mosby (1973) feels that positive data on the influence of dogs on all forms of wildlife are all but impossible to attain, and Marchinton (1973) feels that the effects of dogs on deer have been greatly overestimated, though he does not exclude the probability that some local situations exist where dogs may be a suppressing factor.

Discussion with wildlife officials at the Northeast Fish and Wildlife Conference in Vermont in 1973 indicated that snow-mobile trails in the vicinity of white-tailed deer yarding areas provide access to these areas for dogs to harass the deer. This may also prove to be true in regard to mule deer (*Odocoileus hemionus*) and elk winter range concentration areas in the West.

The West has not been blessed with specific wildlife-dog relationships studies, but observations of dog damage have been recorded and published (Anonymous 1972; Colorado Division of Wildlife 1973; Gaeddert 1973; Houston 1968; and Rocky Mountain News 1973).

In the Rocky Mountain area and similar regions of high snowfall the concentration of big game on limited winter ranges provides an excellent opportunity for dog predation. This is becoming more prevalent in skiing and other recreational areas, as well as in mountain home development areas.

Because of the indefinite nature of information on the impact of dogs on wildlife, the evaluation of such impact in monetary terms is even less tangible. Georgia valued the estimated annual kill by dogs of 3,500 deer at \$145,000. The Colorado Revised Statutes of 1963, Chapter 62, Article 12, Section 4, establishes the per head value to people of the state at \$100 for deer, \$200 for pronghorn antelope, \$300 for elk (wapiti) and \$1,000 for bighorn sheep. This would make Colorado's estimates, based on known kill, of 314 deer, 30 elk and 4 bighorns, worth \$44,000. Regardless of the assessment put on them, the economic value of wildlife losses does not make the impression on the individual that the livestock losses do.

Very little has been said in relation to cats, and probably even less is known about their impact on wildlife than that for dogs. Doucet (1973) described the apparent predation of a snowshoe hare (*Lepus americanus*) by a house cat in an area where wandering house cats have been a serious concern in small mammal studies. A recent four-year study by George (1973) on three rural cats as food competitors of hawks indicated that food competition between certain native birds and cats may be the cause of food shortages during critical periods of the year for such birds of prey as the red-shouldered hawk (*Buteo lineatus*),



Swainson's hawk (*B. swainsoni*), Harris' hawk (*Parabuteo unicinctus*), marsh hawk (*Circus cyaneus*) and sparrow hawk (*Falco sparverius*). He felt that the removal of mice and other prey by cats may be one of the subtle factors involved in the increasing decline of hawk populations. He indicated that the cat may be the most abundant large predator consuming rodents in many U.S. rural sections.

It is apparent, though not well documented, that the impact of dogs (and cats) can be detrimental to wildlife under specific circumstances, depending on the wildlife species involved, the relative populations of predatory and prey species, other mortality factors, habitat factors (quality, physiography, geographic location) and land use (the incursion of developments into wildlife habitats). There may be those who feel that this impact is not significant, and that if the dogs didn't take such wildlife the natural predators would. It is my opinion that any such dog damage is unnecessary, a loss, and I would much prefer that they be taken by wildlife predators and scavengers.

### *Dog Populations*

It must be readily apparent by now that we do not even know what kind of numbers we're dealing with! The increased incidence of reports of dog (and cat) damage has brought a realization that these are but the symptoms of the basic problem or cause—what is popularly termed the pet population explosion.

Population figures received on the survey responses from all the various organizations only totalled over 4.5 million dogs and one million cats. Calculated dog densities per square mile ranged from 0.4 in Kansas to 1,383 in Boston, with an overall average of 197.4 dogs per square mile. Undoubtedly the pet density in New York City, if known or calculated, would be much higher than Boston's.

The American Humane Association (1972) estimated, based on a survey of various animal control agencies, that the United States dog population is 34,100,000 and the cat population is 31,100,000. Beck (1973) cited an estimate by Schwabe that there were 24.7 million owned dogs and an undetermined number of ownerless strays in the United States in 1966. Katz (1973) reported an estimated 100 million to 120 million dogs and cats, of which about 50 million are homeless. Djerassi *et al.* (1973) summarized three different surveys and indicated a range of 70 to 110 million dogs and cats in the United States. This latter group also calculated a ratio of one owned pet to every 2.8 humans, and AHA (1972) has used a ratio of one dog for every 5.9 persons and one cat for every 6.45 persons (averaging approximately one dog or cat to every three people).

The number of puppies and kittens born per hour has been a great attention-getter, and has been used as a scare tactic and fund-raising incentive by some organizations. HSUS (1973) uses a figure of 10,000 dogs and cats being born per hour in this country. Caras (1973:30) stated that:

Every hour of every night and day in this vast land of ours, there are an estimated 15,000 puppies and kittens born for whom there will never be a home of any kind.

One of the most recent and widely publicized articles, as well as being more rational in most respects, was a comprehensive summary of available data on planned parenthood for pets by Djerassi *et al.* (1973) in the Bulletin of the Atomic Scientists. They calculated that there are 2,000 to 3,500 dogs and cats born per hour in the U.S., and indicated that figures such as the 10,000 per hour are clearly exaggerated. At any rate, Djerassi and company (1973) estimated a population of 200 million dogs and cats in this country by the middle of the next decade.

With the expanding pet population it is evident that the trend in dog damage incidents is going to increase. With this increasing population base there will undoubtedly be more strays and uncontrolled dogs. The New York Department of Agriculture and Markets reported an estimated dog population of 1.5 million outside of New York City, of which half are considered uncontrolled at any given time. In his comprehensive study on the ecology of free-ranging dogs in the city of Baltimore, Beck (1973) found that the confidence limits of the density of free-ranging dogs per square mile, based on his censuses, indicated 450 to 750 animals. These estimates are 33 to 50 percent of the total estimated dog population, and consistent with the findings that one-third to one-half of the people who own dogs permit them to run free. If we accept these percentages as a rough approximation of the number of uncontrolled dogs in the United States, and apply them to extremes of estimates of total dog populations, we apparently have between 12 and 30 million uncontrolled dogs in this country.

This number of uncontrolled dogs represents a very high dog damage potential. Table 1 indicated that the highest damage incidence was by pets, or owned dogs, followed by strays and feral dogs. The presence of pets, uncontrolled at the time, in packs, the nucleus of which may or may not be stray dogs, might possibly be explained by two phenomena. One, of course, is the "pack" occasioned by a bitch in heat. The other may be compared to human mob psychology or hysteria, wherein a pack composed largely of Junior's pet Rover and other town and country canines of otherwise respectable ownership band together like "boys out on the town for a night of fun." Dogs which normally or individually would not chase or assault become gripped by the pack mania of the chase, and once blood has been drawn all inhibitions are gone.

### *Feral Dogs*

Feral dogs are cited only 12 times in Table 1, and it is possible that even some of these may include uncontrolled pets and strays, because, as mentioned before, the tendency is to classify any singles, pairs and packs of dogs, particularly when observed away from human habitations, as wild or feral dogs. Scott and Causey (1973) cited McKnight as reporting feral dog populations in nearly every state in a mail survey. Caras (1973) said that conservation officers estimated almost half a million feral dogs in Georgia alone and further stated that feral dogs in North Carolina kill three times as many deer as bobcats (*Felis rufus* spp.) do. The latter figures undoubtedly were misinterpreted from Barick's (1969) report that *free-running* dog and bobcat predation accounts for six and two percent, respectively, of the annual deer mortality.

In Gavitt's (1973) report the free-running dog was defined as any uncontrolled purebred or mixed breed having an owner, and returning to him occasionally for food or shelter. A broader and more acceptable definition was used by Perry and Giles (1971) in that a free-running dog is any uncontrolled dog. In this context, then, and in the sense used in our survey, the uncontrolled dog is any free-running dog, whether an uncontrolled owned dog (pet) or an unowned one (stray), and certainly would include a wild or feral dog.

In a study of wild canids in Arkansas, Gipson (1972) reported that feral and free-running dogs were common by 1964, and that within the state numerous groups of feral dogs are now established. Hard data in published reports do not indicate a very large population of feral dogs in other states, although it's possible that they do occur. Caras (1973) said that there are tens of millions of feral cats and dogs wandering around America.

The ecology of feral dogs was studied in two Alabama areas by Scott and Causey (1973) in which the morphological characteristics, movements, population dynamics and feeding activities were objectives. Three feral packs and two solitary feral dogs were studied, their aggressive behavior when trapped distinguishing them from pets or strays, and confirmed by a follow-up with telemetric procedures. Even in an intensive study such as this, only 12 percent of a total of 40 dogs live trapped were classified as feral. In the areas studied in North Carolina (Barick, 1969) and in Virginia (Perry and Giles 1970) no dogs seen or captured were classed as completely wild or feral.

The Alabama study revealed no evidence that feral dogs were preying on livestock or deer, nor were feral dogs observed chasing deer (Scott and Causey 1973). Feeding observations and dog scat analyses indicated that the primary foods eaten by feral dogs were garbage, rabbits, mice, persimmons and carrion.

The major factor responsible for the success of coyotes, feral dogs and hybrid canids in Arkansas is the availability of poultry carrion (Gipson, 1972). The most common food items found in the stomachs of seven wild dogs were poultry, persimmons, songbirds, deer and rabbits. Gipson (1972) felt that poultry predation may present a serious local problem, but the practice of discarding dead chickens and turkeys throughout the poultry-producing regions of Arkansas could lead to erroneous interpretation of stomach contents, but could also cultivate a taste for poultry and lead to actual predation. Likewise, deer and rabbits ranked seventh and eighth, respectively, in seven and six percent of 212 wild canid stomachs, though 27 percent of the deer tissue was infested with maggots, indicating that it was carrion. This does not preclude the possibility that the wild canids did not kill the deer initially however.

Scott and Causey (1973) found that the Alabama feral dogs reproduced in the wild as well as gaining recruitment from tame and free-ranging dogs. Free-ranging dogs have been common in Arkansas since settlements were established and have at times become wild, establishing themselves as part of the fauna (Gipson 1972). More recently the free-running dog population has increased. The Arkansas Animal Morbidity Report (1973) lists the estimated dog population of 72,000 to 120,000 (based on previously discussed percentages). However, there is no way of determining what percentage of these may be feral, and Gipson does not suggest any specific numbers.

Apparently there is still much to be learned about numbers, food habits, range requirements and other aspects of feral dog ecology, but it would appear that one important factor in inhibiting their increase would be to control all free-running dogs.

### **Conclusions and Recommendations**

It can be stated pragmatically that we have a problem. It can be succinctly stated that the problem is basically that of the uncontrolled breeding and reproducing of companion animals. Attendant problems symptomatic of the basic problem are the increased numbers of uncontrolled dogs and cats, the impact of these free-running domestics on livestock and wildlife (regardless of the magnitude) as well as on the health and welfare of the public, and what can be done about it.

Most states or their political subdivisions have laws pertaining to the ownership, licensing, inoculations against rabies and humane treatment of pets, and some have restraint or leash laws. Most of the laws are very good ones, and if adequately enforced many of the symptoms would be alleviated.

None of the states has, to my knowledge, restrictions on the proliferation of pets. The lack of enforcement of existing laws is, in most cases, due to public apathy, which must be overcome through education involving the understanding, realization and acceptance of the responsibilities of owning a pet.

The psychology of pet ownership is not a subject that can be covered here, nor am I qualified to do so, but it has many implications. A number of people have written about the types of persons, their attitudes, incentives, responsibilities, or lack of them, requirements and various other facets of dog and cat ownership (Beck 1974; Brennan 1973; Djerassi *et al.* 1973; Fox 1973; Friedrichs 1973; Hughes 1973; to name a few). If love and concern can be measured in dollars, the people of the United States are very sentimental, because the enterprises and industries connected with pets are big business! For example, the cost of keeping a dog healthy and well-fed can range from around \$15 per year for the smallest animal eating inexpensive dry food to almost \$700 for the largest dog eating costly canned meat (Abborino 1973). Based on data from Djerassi *et al.* (1973), the annual pet food market is currently estimated at \$1.5 billion, while the purchase, licensing, inoculation and veterinary care of pets must exceed \$3 billion.

In addition to the costs of procuring and maintaining pets, the costs of death are also high. Many people publicize and decry the waste and cost of destroying approximately 12 percent (13 million animals) of the pet population annually at a cost of over \$100 million (Carden 1973; Faulkner 1973; Hindson 1973; Katz 1973; Mancini 1973; Travinek 1973; Whelton 1973 and Wylie 1973). These pariah pets are euthanized by veterinarians, animal control agencies, humane organizations and dog pounds, although their unpleasant but necessary task does not keep pace with the annual pet population increment.

Surgical sterilization (spaying, castration) has been available for many years, but the very logistics involved with even owned pets, much less the possibility of neutering the strays, makes it a tool of pittance. Arguments persist between the veterinary profession and other groups (humane organizations, animal control, etc.) advocating low-cost spaying clinics and the responsibility of the veterinary

profession in participating (Law 1973; Emerson 1973; Djerassi *et al.* 1973; Menning 1973; AVMA 1973; Wylie 1973). In 1971 Los Angeles opened the first municipal spay and neuter clinic for dogs and cats in the United States, which ran at a small deficit the first year, but appears to be a success and eventually self-supporting (Djerassi *et al.* 1973; Westin 1973). Many humane organizations run neutering clinics in connection with their facilities, and some require sterilization or a deposit toward it for each female animal adopted. Efforts toward this approach are exemplified by Senate Bill 1032, introduced by Senator Bayh (D., Ind.), which would provide loans for the establishment or construction, or both, of municipal low-cost, nonprofit clinics for spaying and neutering of dogs and cats. The AVMA (1973) has charged that such legislation is in conflict with state veterinary practice acts, and is opposed to it. As stated before, surgical sterilization is a step in the right direction but will not solve the problem, and many pet owners would not take advantage of it even if it were offered free of charge to them (their pets).

Other forms of reproductive inhibition show promise, but are not widely available, precisely developed or acceptable yet. These include hormonal implant pellets, such as developed by Syntex, a California pharmaceutical firm, which prevents estrus and conception (Westin 1973), or the injection of gonadotropins to prevent the normal functions of the testicles or ovaries (Faulkner 1973). The possibilities of puppy-plugs, or intrauterine devices, are also being investigated (Agrophysics 1973; Anonymous 1973b). It has been suggested that chemical sterilants could be incorporated in commercially prepared pet foods, but the unlikely fact that some 25 percent of such is consumed by humans (Beck 1973; Djerassi *et al.* 1973) may have some surprising effects on the public! As promising as prospects may appear for some of these anti-breeding approaches, their final development, testing and practical application are at least 3 to 10 years in the future (Djerassi *et al.* 1973; Faulkner 1973). Until that time, then, treatments must still be symptomatic or incomplete.

Control of surplus animals through capturing strays (Colorado Municipal League 1973; Jackson and Davies 1972; Slayton 1972) must not only be maintained, but stepped up, as well as insistence on increased law enforcement. The problem of unwanted dogs may not occur in all parts of the world, as there are still many peoples who consume the flesh of dogs, even in China, where eating dog meat is popular during the winter months, though illegal (Rocky Mountain News 1973c).

It is suggested that serious consideration be given the following recommendations to alleviate not only the basic cause but the ancillary problems concerning dogs and cats in the United States.

1. Introduce uniform standardized laws throughout the states, or through federal legislation, on licensing, control and breeding of pets. This would include enumeration of owned pets through official census takers or income tax returns, the clearly observable identification of licensed animals (collars, tags, even bells on cats), immunizations, a substantially higher license fee for unaltered animals, teeth in the enforcement aimed at the owners and not the animals, and a public education program on the requirements of pets and the responsibilities of ownership.

2. Secure voluntary financing or governmental appropriation to accelerate the development and investigation of widely applicable, efficient, economic and safe methods of birth control in pet populations.

3. Implement intensive efforts toward the extirpation of stray and feral pet populations.

The end result should be a healthy population of companion animals sharing the urban environment with man, thus creating a genuine respect for life, as stated by Beck (1974).

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## Discussion

DISCUSSION LEADER JANTZEN: Well, you have been treated not only to a very interesting and, as Dick points out, little known subject, but also to some suggestions.

This is an interesting subject and there probably will be questions.

MR PHILLIP GIPSON [University of Arkansas at Fayetteville]: We have been conducting a study of dog-deer relationships during the past two and a half years. We are beginning to come up with some indication of what is happening in terms of how dogs and deer interrelate.

One phase of our study that I think is of some interest and relates here is: What about these deer that are actually caught and killed by dogs? We have a cooperative understanding with our Game and Fish Commission that whenever a deer is actually caught by dogs, our conservation officers will acquire that deer and there will then be necropsy.

To date, we have limited data, but at least they are indicating trends. We have twenty-four deer that are known to have been caught and killed by dogs. These were actual observations. Only two of those deer could be considered healthy animals. The remainder had either been shot with small caliber guns, or they were diseased in some manner.

This uncontrolled dog definition that you gave would have to be expanded if you consider the Southeast. One of our biggest groups of uncontrolled dogs there are the hunting dogs. In Arkansas, we have met with some resistance in trying to control these dogs, especially by fox and coyote hunters who feel that they should be allowed to turn their dogs loose and, at times, two or three days are required to round them up. This creates a special problem.

MR. DENNEY: I'm glad to meet Mr. Gipson. I referred to his very excellent work on the wild canines of Arkansas in the paper. I'm sorry I didn't get to mention it.

That is a very good question. Actually a proper definition of an uncontrolled dog is any dog that is not restrained or is out of human control. I recognize that in terms of legal hunting of wildlife with dogs there will be cases when they may be out of control.

We have talked about feral dogs, and truly I think there are not nearly as many as people commonly believe. They have a serious implication as far as their impact on wildlife, and it may not be wholly in terms of a predator-prey relationship, but perhaps more in terms of the fact that these pariah bitches represent a dilution of the gene pools of natural predators. We also run the danger of some preservationists, along the lines of wild horses and burros, soliciting protective legislation which may preclude any talk of management.

MR. ROBERT DOWNING [Virginia]: I would like to strengthen Mr. Gipson's statement about the tendency for deer that are caught by dogs, in the Southeast at least, to be either extremely old, diseased, or to have had previous injury. For some years now, we

have been encouraging anyone who gets a deer that is suspected of being killed by dogs to have it posted by a state diagnostic lab or by the Southeastern Cooperative Disease Center. I am not aware of any deer to this time, except the two that Phil just mentioned, that could be considered truly healthy deer.

MR. DENNEY: This is especially true in the Southeast. I also think that probably the majority of deer whose killings have been attributed to dogs have not been necropsied, and it makes me wonder what the incidence is of flukes and lungworms and many of the other things. What do you really call a healthy deer? I wonder how many we have in a representative population of wildlife anyway?

Here in the West, we have different circumstances, of course, which, as I mentioned, includes the snows. There are several Colorado Division of Wildlife Conservation officers here and I think they can attest quite well to the fact that it is a matter of opportunism and this type of thing in connection with several other factors like crusted snow, the depth of the snow, fences, and various other aspects concerning mule deer in this area.

DISCUSSION LEADER JANTZEN: Dick, you touched on the indemnification laws of some states or that governmental entities have, and also provided some information on the loss in dollar terms. Did you get any information as to the amount of money that is spent in enforcing the laws that do exist?

MR. DENNEY: We didn't ask that question specifically on the survey, Bob, but there is a good report on the general aspects of the pet population explosion in the *Bulletin of Atomic Scientists*. They disclose that, based on the best available information, the cost of control (and they add the value of losses as well) as being over \$5 million a year. There are some very tremendous figures concerned with the care of pets—procuring them, the veterinary treatment of them, immunizations, and so on—and it exceeds something like \$5 billion per year spent by the American public.

MR. RAY OWEN [University of Maine]: Would you care to comment on your data on house cats? It is my opinion that songbirds and at least one game species, the woodcock, may have fairly high predation by house cats.

MR. DENNEY: That wasn't actually a specific objective in the survey. However, very little has been said in relation to cats and probably even less is known about the impact on wildlife than for dogs. But a recent four-year study by George in Illinois on three rural cats as food competitors of hawks indicated that food shortages during critical periods of the year, with the removal of mice and other prey by cats, may be one of the several factors involved in the increasing decline of many hawk populations. He indicated that the cat may be the most abundant large predator consuming rodents in many U. S. rural sections.

This was one of the reasons that it has been recommended and, in fact, it is in certain city ordinances where cats are required to be licensed or immunized, that perhaps they wear a bell on their collar.

MR. HAROLD NESBITT [National Rifle Association]: I am currently wrapping up a six-year study of feral dog relationships in Southern Illinois on the Crab Orchard National Wildlife Refuge.

It might be of interest to the group that during the six years of the study more than two hundred head of cattle were pastured in the range of a six-member feral dog pack from April through October. Not a single occurrence of predation was observed during the study. And I think it has some bearing on some of the previously reported research which has been very derogatory toward feral dog relationships. This was a true feral dog pack. It was born on the area. Most of the original members of the pack are still there, and it is a resident, very natural part of the environment, although, of course, this is a somewhat altered environment, as most of our environment is.

MR. DENNEY: Thank you. That supports very much the findings by Scott and Causey on feral dog ecology in Alabama in which they instrumented a number of feral dogs. I think there were three packs and two individuals involved. Also, Mr. Gipson, who commented a moment ago, had a stomach analysis of seven wild canines in his excellent discourse. Strangely enough, down in that part of the country persimmons rated very high as well as rodents and, of course, carrion. In fact, Gipson attributes the success of feral canines in Arkansas greatly to the dumping of poultry carcasses. These being available to these animals in the form of carrion.

CHAIRMAN WAGNER: Those of you who live east of the hundredth meridian may

or may not be aware that the single, largest, organized predator control effort in the United States is that of the control of coyotes for the protection of the rural sheep industry. It is an effort which involves an entire division of the Bureau of Sport Fisheries and Wildlife, the Division of Wildlife Services, which operates under a budget of somewhere between \$7-and \$8 million. We should probably add that some 60 percent of that is underwritten by the sheep men themselves. But, in addition, there are private and state, and in some cases county, efforts in the direction of coyote control for the sheep industry. In some cases, cattlemen also report losses of their calves.

Probably you are all aware that in February, 1972, President Nixon issued an Executive Order banning the use of toxicants on all public lands and instructing the federal agencies that they were no longer to use toxic agents. Subsequently, the Environmental Protection Agency has placed federal restrictions on the use of these so that effectively they are not in use at this time.

This has set in action a series of changes in the whole pattern of predator control in the Western United States, and we don't yet know the full form which predator control or at least coyote control for the livestock industry is going to take because those changes have not yet fully come about. At the same time, there was the release of long overdue, sizable funds for research into alternate methods of coyote control, into the extent and pattern of livestock losses and into a number of related questions in this whole matter of predator losses of livestock.

Our next speaker is Mr. Donald S. Balsler who is Chief of the Section of Predator Damage Research at the Denver Wildlife Research Center of the Bureau of Sport Fisheries and Wildlife, and he is going to bring us up to date on what some of the latest developments are in the last couple years since the issuance of the Executive Order.

# An Overview of Predator-Livestock Problems With Emphasis on Livestock Losses

Donald S. Balsler

*Chief, Section of Predator Damage Research, U.S. Fish and Wildlife Service,  
Wildlife Research Center, Denver, Colorado*

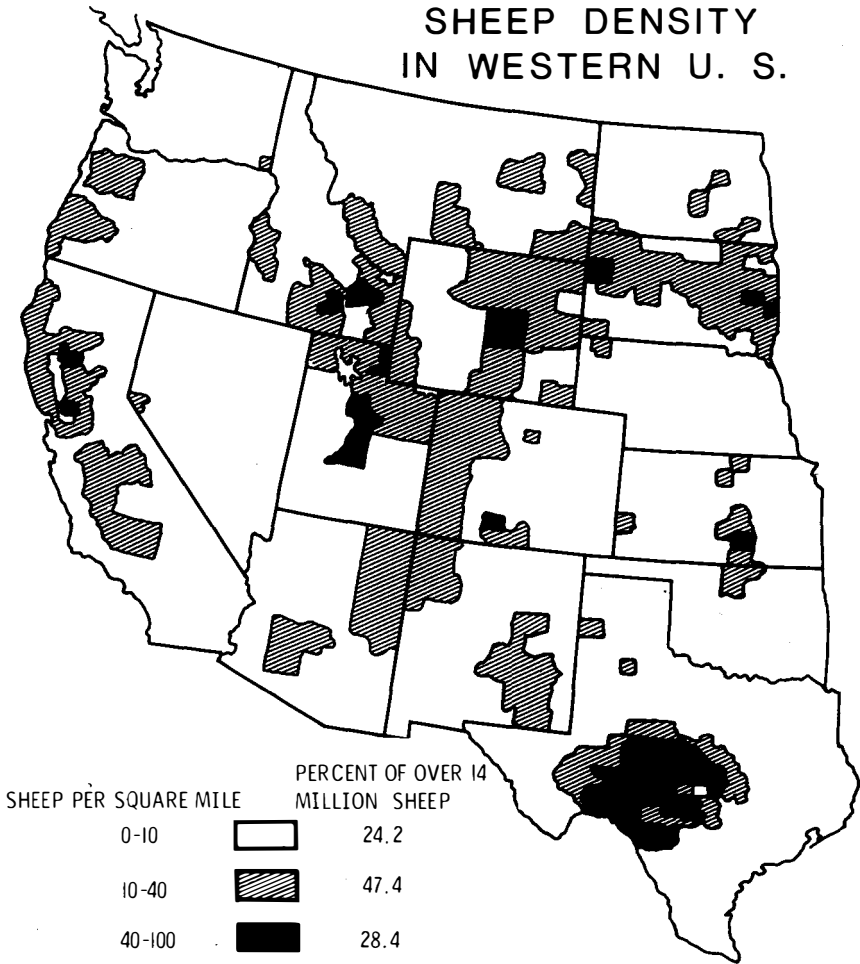
The theme of this conference is Balancing Environmental and Economic Goals. The predator-livestock controversy is a key case in point. The problems of livestock losses to predators in the western United States are compounded today by confusion caused by too many participants, misinformation from non-authoritative sources, human emotion which polarizes opinions, and most important of all, a lack of data on livestock losses and effects of predator control.

In the few minutes we have, we can only cover the livestock loss problem in brief. The public has received considerable misinformation about predator control. Predator control is applied primarily to livestock areas, and only about 10-25 percent of the land area is under control at any one time instead of the entire western United States. The control effort is concentrated where the most sheep occur, first because these are the areas where funds originate, and second, because they generate the most complaints. Only one-third, or 343, of the 1,059 counties in the 17 western United States have over five sheep per square mile and need intensive control. Another third, or 348 counties, have one to five sheep per square mile and probably should be handled on a current complaint basis only. The remaining 368 counties have less than one sheep or none per square mile. Figure 1 shows the distribution of stock sheep in the 17 western states, from data compiled by E. W. Pearson of the Denver Wildlife Research Center. Although this winter distribution may differ from that during summer, it illustrates the size of the areas where sheep-raising is negligible. Where coyotes outnumber sheep, population control of coyotes would be ridiculous.

The coyote population in the western United States can be considered large and healthy. It has withstood the application of eight or so lethal methods and followed fluctuations over the years that appear to be largely independent of man's control. Effective control of damage is a management objective that is compatible with maintaining coyote populations over most of this range.

A variety of large predators is sometimes involved in predation on livestock, including sheep, cattle, goats, turkeys, and other domestic stock, but in the western United States the major losses involve coyotes killing sheep. For example, the 1972 ratio of sheep losses to calf losses in the states where data from Wildlife Services are complete was 20 confirmed sheep kills for every confirmed calf kill. The heart of the predator controversy centers around the problem of characterizing the sheep loss situation. Lehman (1969) reports that

## SHEEP DENSITY IN WESTERN U. S.



SHADED AREAS COVER OVER 75% OF THE SHEEP IN THE WEST. BASED ON STOCK SHEEP, SUMMER DISTRIBUTION NOT SHOWN.

**Figure 1**

in the 1880's sheep losses in south Texas ranged from 2 percent to 20 percent. Losses today approximately span the same range, depending on the degree and effectiveness of control.

A single total or average loss figure cannot fairly represent the livestock loss for the entire West. It is also quite unlikely that any such loss figure can be obtained on a statistically reliable basis because of the sampling difficulties and cost. Field losses should be portrayed by their frequency distribution among ranchers according to size of operations. Some ranchers have serious problems while others have none. Furthermore, confusion reigns in the statement of loss

figures. Losses can be stated as a percentage of total sheep lost to predation, a percentage of total lambs lost to predation, or a percentage of predation losses to total losses. A 3 percent loss of total sheep to predation may be a 6 percent loss of lambs (ewes plus lambs) or 50 percent of the total losses due to all causes. One must carefully qualify the basis from which loss figures are derived.

The Leopold Committee Report (Leopold 1964), the Cain Committee Report (Cain *et al.* 1972), and Wagner (1972) have previously reviewed and discussed the sources of loss data. I would like to comment further on six of these sources as they appear today.

The first is the data of the USDA Statistical Reporting Service (1973) on total losses by states for ewes and lambs as reported by questionnaires. As Wagner (1972) mentioned, the SRS total loss figures do not assign causes but at least set an upper limit on predator losses.

There are several indications that the SRS total loss figures are too low for lambs because of the lack of fetal birth rate counts (number of lambs actually born) for either range or shed lambing operations. Rather, they are based on standing lamb counts or counts at tail docking. For the 17 western states in 1972, the SRS reported an average total ewe loss of 7.2 percent and an average total lamb loss of 11.5 percent. The total loss figures appear to differ between states, but the reasons are not clear. It may be the weather gradient effect on lambing, low coyote populations on such areas as the Edwards Plateau, or management practices. The total losses in the West also do not differ much from those in the eastern United States, where dog losses and heavy parasites (due to the damper climate) may offset coyote losses. The average total ewe loss in 31 eastern states was 9.0 percent and the average total lamb loss was 12.7 percent.

A second source of data on predator losses is questionnaire surveys in Texas, Colorado, Wyoming, and Montana reported in a review by Reynolds and Gustad (1971). Their overall estimate of a 5.3 percent average predator loss of the total sheep inventory may appear to be high when compared with results of biological studies but is based on the full frequency distribution of losses. Current biological field studies appear to sample primarily the lower range of loss distribution and so do not cover heavy loss situations. If this is true, Reynolds and Gustad's calculations are not too unrealistic, particularly their estimate that predator losses amount to 24.6 percent of total losses. Applying this 24.6 percent (or 25 percent as rounded off) to the total SRS losses of 7.2 percent of ewes and 11.5 percent of lambs for the 17 western states (including Kansas) gives us a figure of 1.8 percent ewe losses and 2.8 percent lamb losses due to predators. These estimates are fairly close to the results of biological field studies as we will see later.

A third source of loss data is reports to the U.S. Forest Service by grazing permittees. Again, these are by herders' and ranchers' estimates and include missing animals. Although the estimates cover only the summer grazing period, which averages about 2-1/2 months, they come from what might be termed high-risk predation areas. On summer range, we have measured predator losses as high as 48 percent of total losses as compared with Reynolds and Gustad's (1971) estimate of 24.6 percent. In one instance 30 lambs out of 300, or 10 percent, were lost in 1 month to coyotes on a repellent study area in

Colorado (Swanson, personal communication). This points out again that every predator situation must be considered individually rather than applying generalizations.

A potentially serious bias in the reports is that the Forest Service counts only adult animals; females with young under 6 months are counted as one animal unit. Therefore, ranchers' counts of lost animals calculated as percent losses on the basis of only ewes are apt to be almost twice the percent of total sheep lost. It has been assumed that losses to predators in Forest Service reports are about half the total losses to predators. Losses on summer grazing land are apt to be much higher than earlier losses, since lambs are better protected at lambing, particularly when sheds are used.

Obviously, loss data from Forest Service reports cannot be extrapolated to other seasons or other types of grazing situations. One reason for citing them is that counts are available on and off the National Forests. Similar data are missing from birth to docking or from birth to the date when sheep are moved on to the forest. And again, there is an obvious need for fetal birth rate data to use as a base against which to measure total losses. Without accurate birth rates, it is just as possible to underestimate predator losses and total losses as to overestimate them.

A fourth source of loss data is personal interviews conducted by Nielson and Curle (1970) and by V. W. Howard of New Mexico State University (personal communication). The interview type of study appears to be a considerable improvement over questionnaire surveys. The two studies cited give the distribution of losses among the ranchers interviewed and are therefore more useful (Fig. 2). Although the interviews were conducted in Utah and New Mexico in different years, approximately 50 percent of the ranchers in both studies reported less than 5 percent predator losses, 25 percent of the ranchers reported 5-10 percent predator losses, and 25 percent reported over 10 percent predator losses. This distribution of losses may reflect the distribution of control efforts as much as the rate of predator losses. The New Mexico study is still underway and will not be complete for another year. My thanks to Dr. Howard for letting us take an advance look at part of the data. One can see a similarity between the 2-20 percent range of losses reported from south Texas in the 1880's and the loss distribution of zero to 25 percent or more shown in these surveys.

A fifth source of loss data is the records kept by the Division of Wildlife Services, U.S. Bureau of Sport Fisheries and Wildlife. Attempts to tabulate these data to obtain the numbers of signed control agreements in relation to numbers of sheep operators in each state, the acreages under control, the number of sheep and calf complaints, or the number of confirmed and unconfirmed sheep and calf losses have not met with success. The procedures for collecting and recording such data vary greatly among fieldmen and states, and the questions on the various field forms are quite often subjective and do not lend themselves to well-defined tabulations. I also could not determine the number or percent of ranchers that submit complaints in individual states, the size distribution, or the acreage or number of animals protected where control is applied. However, the losses reported on complaint forms appear very minimal, based on the availability of DFA's (government trappers) and the

## DISTRIBUTION OF PREDATION LOSSES

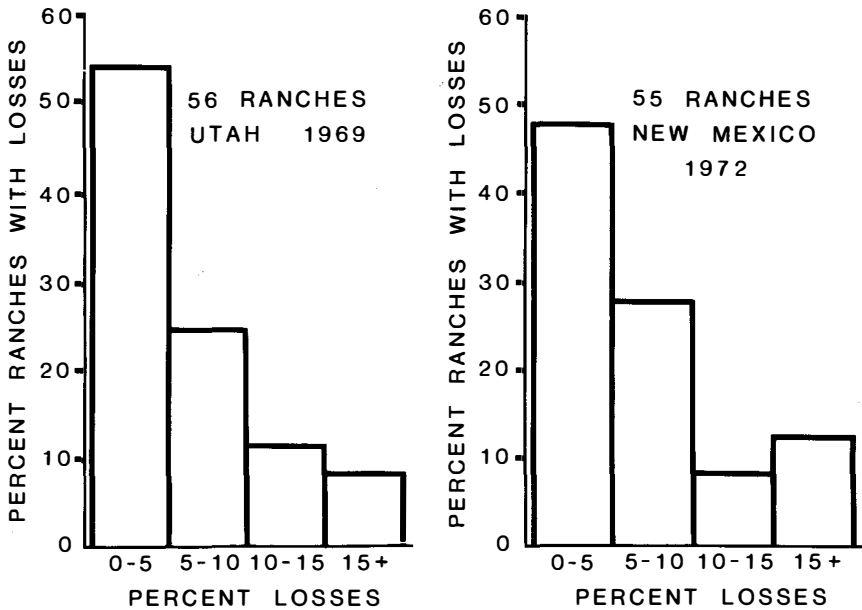


Figure 2

slowness with which ranchers usually report losses. Once losses are confirmed by a trapper, the search for additional losses is usually terminated in favor of initiating control activities; this results in further minimizing loss reports. The number of confirmed sheep kills per complaint was only 1.7. A clearer definition of what constitutes a complaint or predation incident needs to be worked out before control efforts can be tabulated. Delayed reporting, that is, losses derived from counts at shipping subtracted from docking counts, cannot even be validated, let alone responded to effectively by any control program. Unfortunately, such delayed reports constitute a major portion of the estimated losses and cause the wide discrepancy between confirmed losses and losses reported on surveys. Delayed reporting also causes the emphasis to be placed on population reduction rather than removal of complaint animals.

The sixth and last type of loss measurements are the biological studies where an attempt is made to necropsy all dead animals found on field searches. There are currently five underway, three in California, Utah, and Nevada and two by our Bureau's research teams in Idaho and Wyoming. In the latter studies, we are attempting to determine all losses and break them out by time and cause. In addition, we are trying to obtain accurate birth, docking, and shipping counts to serve as a base for measuring losses (Tab. 1).

This is only an example of the type of information we are seeking; the results are preliminary. Most of these studies are incomplete and require several years of data. The Idaho Study (R. D. Nass, personal communication) indicates total ewe losses of 6.8 percent and lamb losses of 11.3 percent, very close to the total



losses reported by the SRS. In looking at the results to date, it generally appears that predator losses range from 1 percent to 4 percent under intensive predator control. Such a range or average may mean nothing more than that control is effective in reducing losses to this point, or that when losses exceed this level, control is not effective. The role such losses play in the profit and loss figures of ranch operations is not known. Further economic studies are needed on ranch operations to determine what various loss levels mean. However, we can conclude that these losses not only come off the top of the profit margin, but waste the investment in carrying the ewe units through the winter and spring.

It is important to note that *all the loss studies to date are with control in effect* and do not indicate what predator losses are without predator control. There is a real question of how far we should go in measuring losses with control in effect. This does little to indicate the value of control or lack of it. In most of the biological studies, approximately 60 percent to 70 percent of the losses are due to unknown causes. A major objective in our damage assessment studies is to decipher this unknown loss figure and determine how much is due to predators. This will undoubtedly raise the minimum predator loss figures, but in our Idaho studies the known predator loss plus the unknown loss adds to a maximum predator loss of only 4.4 percent. Again we must ask, how much is it worth to solve the unknown loss question? Since unknown losses are larger than known losses, we feel it should be answered. We recognize that the rancher, herder, and trapper cannot be criticized for reporting losses when the biologists cannot find many of the missing animals, let alone determine the cause of death in every case. The following example illustrates the unknown loss problem expressed in terms of time and space relationships. On the basis of the 1973 sheep inventory, a 1 percent ewe loss and 4 percent lamb loss means that about 500,000 sheep are lost annually in 17 western United States. On any given day, this is one animal for over 1,300 square miles, assuming losses are distributed evenly over time and area, which they are not, of course. What chance would one man on foot or on horseback have in one day to find this dead animal even if the area were condensed 90 percent to 130 square miles? Fortunately, livestock, predators, and kills are concentrated more than

**Table 1. Sheep Losses — Idaho Study — 1973**

	Birth to docking		Docking to shipping	
	Ewes	Lambs	Ewes	Lambs
No. animals	9750	12836	8664	11980
Known predator losses	0	11	45	135
Other known losses	86	821	53	100
Unknown losses	0	0	151	393
Total losses	86	0	151	393
Total lambs lost	05.2%			
Minimum predation	01.1%			
Maximum predation	04.0%			
Unknown losses	62.0%			

this, but it serves to illustrate the difficulty of obtaining accurate loss data by field search techniques. Much of predation, whether on livestock or game, is well hidden from man's observations. Predation and other mortality studies have long been neglected because of the lack of techniques and resources to obtain reliable data on such a difficult problem.

To summarize the livestock damage situation, any loss measurements are a reflection of the degree of control in effect today. To improve our understanding of predation losses, we need the following:

1. More accurate measurement of total losses and a clear-cut breakdown of their causes. This includes obtaining fetal birth rates rather than starting with tail-docking counts.
2. A broader-based sampling of predator losses to obtain frequency distributions among ranchers according to size of operations, location, management practices, and type of grazing land.
3. A measure of predator losses without predator control that can be compared to current studies with predator control and replicated a number of times over several years. This is necessary to establish the value of control in reducing damage.
4. An improved system of reporting and recording losses to aid in recognizing where, when, and how much control is needed and to provide needed base data to evaluate control programs.

In balancing environmental and economic goals, the environmental goal of making the entire western United States a coyote preserve is just as unrealistic as the economic goal of eliminating predators in the western United States. Predator management requires the full freedom of options ranging from complete protection on National Parks or wilderness areas to population reduction in intensive livestock areas to local elimination on endangered animal farms or zoos. The balancing of goals can only be achieved by flexibility and responsiveness in management.

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### Discussion

DISCUSSION LEADER JANTZEN: Don, that was a fine presentation. I would like to observe, having watched the controversy build and spill over into various other buckets,

that probably one of the major benefits of all of the traumas that we have been going through in the last two or three years is that now we are starting to get information of this nature which we so desperately needed for a long time.

MR. TOM TOWNSEND [Ohio State University]: I wonder, Dr. Balsler, if you could comment about your appraisal of an insurance program of some sort, underwritten, presumably in part, by the Federal Government, involving coyote losses.

MR. BALSER: A strict insurance program is based on the willingness of the group to accept the losses of a few. Apparently the distribution of coyote losses is sufficiently unpredictable and yet they seem to occur with some degree of regularity so that all ranchers are not willing to accept these losses universally. We are very inexperienced in this area of insurance, but in Colorado and in Montana, in two cases where insurance policies were taken out on total livestock losses, as soon as they reached the limit, the insurance policies were cancelled. In other words, in the case of Montana, 25 percent losses were suffered by one sheep rancher and they cancelled his policy. In Colorado, the limit was something like \$500. So, as yet, there seems to be an inability to get together on general insurance policies. As to whether or not this program would be run by the Federal Government, I have not explored. There is a recent report on this. I wish I could give you the reference.

MR. STEVE JOHNSON [Defenders of Wildlife]: I would like to ask Mr. Balsler if he has any data which would support the frequently voiced claim that "Coyotes have driven me out of business."

MR. BALSER: We would like to assemble this information. With the absence of support prices, we might not be able to get the job done because they are not recording data. The margin of profit is a minus two to plus four percent. Certainly the excessive losses that we have run into in a few situations—10 percent of a lamb crop in Colorado, 25 percent on one of our study areas in Montana—cannot be sustained by sheep ranchers on such a low margin of profit.

As to the number of sheep ranchers going out of business, I have no data on this, but I would refer you to some of the work being done in Montana by Ken Seyler from the Livestock Commission in which they have attempted to tabulate the number of sheep ranchers. With a high loss situation and a low margin of profit, it is entirely possible that many of these men do go out of business because of this loss. And we get all kinds of information that many grazing allotments today are not grazed because the ranchers cannot sustain the losses on those grazing allotments:

MR. JOHNSON: Thank you. In fairness, it should be mentioned, too, that since about 1947 the sheep in the United States have been declining in numbers, and up to 1972 the sheepmen had everything at their disposal for control. So the decline in sheep numbers must be laid to causes other than predator control. The decline has just happened. It is a sick industry and it has its own problems. To what extent does the public prop it up at the expense of the natural ecosystem? I talk to many sheep ranchers who appear to be committed to the perpetuation of a monoculture on the public lands.

DISCUSSION LEADER JANTZEN: Will you respond to that?

MR. BALSER: I don't care to respond; that's a comment.

MR. MAYNARD CUMMINGS [California]: Rather than comment upon your presentation, I would like to make a comment on your introduction. In introducing you, the Discussion Leader addressed his remarks specifically to members of the audience from east of the one-hundredth meridian in explaining what might be to them some unknown things about the predator control programs. And he went on to say that these are conducted by the Federal Government and state and local government for "the benefit of the wool and sheep industry."

While we always seem to get around to this kind of polarization, it is unfair. It is the truth, but not the whole truth. This is the kind of misinformation or partial information that has been presented, particularly in recent years, to the public on this side of the one-hundredth meridian. These animal control programs are conducted not just for the sheep industry. I have been throughout the West, but I will speak specifically for California where, as Dick Denney mentioned, the poultry producers are equally concerned and so is the cattle industry. The program at the state level in California is also funded by the State Department of Public Health. So there is a public health potential

involved here. And these combined animal control programs are conducted for all of these reasons, not just to protect the rural industry.

MR. BALSER: Thank you, Maynard. And we might all reconsider the impact of the coyote on young black-footed ferrets and in the genetic swamping of the red wolf and the other things that can happen when you have too high a single species population. A monoculture of coyotes will create a whole new set of problems.

DISCUSSION LEADER JANTZEN: In your studies, have you attempted to relate density information or population sizes of the so-called defending animals to the areas where you don't have problems so far as predation is concerned?

MR. BALSER: That is an important question.

Unfortunately, when you try to index coyote abundance data with livestock density, we find that they do not correlate well because of variables introduced by the control programs. However, there does appear to be a direct relationship—not proportional—between the numbers of coyotes and the number of depredations. But there are many factors involved in livestock losses, not only the coyote density, but the stocking rate of the sheep, terrain and vegetative conditions, weather and, most certainly, management practices. When all these react together, we have heavy predation situations. We do have the data coming out on the relative index on coyote populations through western United States by Linhart and Knowlton. It should be ready in a month for distribution to the game and fish departments of the universities.

CHAIRMAN WAGNER: Mr. Cummings, I believe I mentioned cattle losses, but I am sorry I left out the poultry growers, public health aspect, and wildlife aspects.

Unfortunately, policy in predator management is substantially a matter of working between conflicting values. Up to this point, we have looked essentially at some of the negative values attributed by many to predatory animals. We also have the positive and there are many reasons—aesthetic, ethical and certainly very practical—why we desire to maintain biotic diversity in the environment in which we live.

The remaining three papers are concerned with the preservation of some of that diversity and, in particular, concerned with the management of some endangered predatory species.

# Current Problems and Techniques in Raptor Management and Conservation

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## Introduction

Throughout most of the world there is an increasing awareness of the steadily declining nature of many species of raptorial birds. On the American continent it is most dramatically expressed by the bald eagle (*Haliaeetus leucocephalus*) in the southern states, the osprey (*Pandion haliaetus*) in some areas of the Atlantic states, and the peregrine falcon (*Falco peregrinus*) particularly south of the Canadian Maritime Provinces. Although the problem of declining raptor populations transcends the political boundaries of any one country, most of my remarks will apply to North America, recognizing that the causes seem to be universally common. A review of the recent edition of Threatened Wildlife of the United States (U.S. Dept. of Interior 1973) shows that 42 percent of the species of the Falconiformes in North America are represented on various lists by either a full species or subspecies of one because their population status is of concern. Some have been categorized as "threatened" while others simply have an undetermined status. Owls, the Strigiformes, are in better shape, but because they are harder to study, less is known about them.

Seemingly the reasons for these declines fall into at least five, though perhaps more, broad categories, *i.e.* 1) a diminution of raptor habitat through man's utilization of it, 2) reduction of raptor food sources, 3) effects of chemical pollutants, primarily the chlorinated hydrocarbons, 4) direct mortality by shooting, electrocutions, etc., and 5) exploitation for personal or economic gain. I will discuss the problems facing raptors and their management as it applies to these categories and then present some of the methods and techniques being used to help moderate the causative factors. Since the topic is so broad and the space limited, I must, of necessity, present an overview of only some of these problems.

## Problems

### *Land Use and Prey Populations*

One of the more significant acts of the Department of Interior in recent years was the creation of the Snake River Birds of Prey Natural Area. It embraces a 33 mile stretch of the Snake River in Idaho, commencing about 5 miles downriver from Grand View and terminating 5 miles upriver from Walter's Ferry, and it includes the canyon, canyon walls, and the continuous lands up to 2 miles each side of it. Nesting prairie falcons (*Falco mexicanus*) may be denser there than any place in North America with densities of about one pair per 0.6 miles (Ogden 1972). Golden eagles (*Aquila chrysaetos*) are likewise extremely dense with about one pair per 3 miles (Kochert 1972). Two other

hawks and two owls are also common nesters on the canyon walls. Eagle and falcon populations are able to achieve such densities because of the combination of several factors such as abundant food, nesting sites and relative remoteness from human intrusion. Perhaps as important a factor as any is the abundance of the prey base of both the black-tailed jackrabbit (*Lepus californicus*) and the Townsend ground squirrel (*Spermophilus townsendi*) that exist on the sage and grass-covered tableland adjacent to the canyon. Thus, working in concert is the combination of suitable cliffs in proximity to an abundant and vulnerable prey supply. Without either, such populations cannot be expected to persist. The ground squirrel is apparently restricted to certain soil types. The distribution and abundance of these soils are yet largely unknown. During the past two years, without apparent regard for distribution of soil type preferred by squirrels, distribution of locally dense populations of rabbits and squirrels, etc., this land has been under scrutiny by developers as provided for by the Desert Land Entry Act (Morlan Nelson, pers. comm.). Should this sagebrush land be developed for consumptive uses in such a manner as to reduce or eliminate the mammalian prey base, the raptors will likewise be reduced or perhaps be eliminated. Irrespective of laws or regulations protecting the canyon and the Natural Area, irrespective of laws protecting the birds themselves, irrespective of the federal action which initially set this area aside, and irrespective of the continued presence of the magnificent cliffs necessary for raptors within the Natural Area, the birds of prey cannot be expected to survive without the prey base that helped produce and maintain this local abundance of raptors. Land use practices unrelated to the canyon at areas rather distant from the canyon itself, then, are seemingly the key to the continued existence of this local phenomenon.

A similar example exists in Canada where studies have been made by Richard Fyfe (pers. comm.) of the Canadian Wildlife Service. The merlin (*Falco columbarius*) in the prairie provinces is associated with the aspen- or prairie-parkland communities. The interspersion of woodlots which provide nesting habitat with grasslands that provide feeding habitat is paramount to the maintenance of the merlin in that region and a rather distinctive subspecies (*F. c. richardsoni*) has apparently been a product of the evolution of the prairie-parkland system (Temple 1972). Near Kindersley, Saskatchewan, a known population of about 15 pairs of merlins existed up into the 1950's. The grasslands and parklands were altered and replaced with cropland monoculture. As a result of the monoculture, the merlins' prey species were reduced and the nesting habitat was all but eliminated. Today no merlins breed in that region. By contrast, another local population of about 25 pairs of merlins in South-Central Alberta is currently under investigation. The Alberta area has historically had a rather large population of merlins. The land was one of high human use prior to the depression of the late 1920's and early 1930's, but at that time farmsteads were deserted and the land largely lay fallow. Shelter belts of trees were left and native grasses remained or returned and today the fields are used mainly for grazing of cattle. The native birds that provide a prey base are common because of the presence of native grasslands and the interspersed trees provide nesting sites. These merlins are reproductively successful and are seemingly maintaining a rather constant population in spite of the fact that they are also carrying levels of chlorinated hydrocarbons high enough to be of

concern to the Canadian Wildlife Service (R. Fyfe, Ms and pers. comm.). The key to the continued existence of the Alberta merlin population has been the maintenance of a suitable habitat, even though the lands receive multiple human use and even though the merlins have chemical residue levels high enough to be of concern, as it may effect their reproductive performance.

The U.S. Fish and Wildlife Service has set a precedent in at least some land use management practices as concerns bald eagles. One example is the effort centered around work headed by Fred Robards of the Bureau of Sport Fisheries and Wildlife. In the mid 1960's wholesale lumbering operations were underway in the Tongass National Forest of southeastern Alaska, particularly on Admiralty Island. One of the remaining strongholds of the bald eagle in the political confines of the United States is in southeast Alaska where they use spruce and hemlock trees for nesting. One tree known to be used by eagles for nesting in 1907 is still in use. To offset the devastation to nesting trees by current lumbering practices, each tree was identified and marked. The identifying markers state that the tree containing the eagle nest is protected by federal law. Accordingly, Forest Service personnel then mark off a 330 foot buffer zone around the tree inside which logging is prohibited. The utility of this practice can only be manifested with time, but it currently appears to be useful in maintaining multiple use land practices, while at the same time preserving stable bald eagle populations. A similar practice is being used in osprey management in the Deschutes National Forest, Oregon (Robert 1970).

### *Exploitation of the Arctic*

The impact of oil and gas exploration in the Arctic, has received much attention (e.g. Bartonek *et al.* 1971; Weeden 1971). Aside from the importance of large ungulates and waterfowl in the Arctic economy, a considerable population of raptors of at least three species also breeds there.

These species may prove to be rather tolerant of human activities although studies have yet to be done to demonstrate this. The Arctic populations are singularly important, however, because the Arctic represents essentially the only breeding grounds of the gyrfalcon (*Falco rusticolus*) and, aside from the Pacific Northwest, the last largely intact population of peregrine falcons of any magnitude in North America occurs there (Cade and Fyfe 1970). Mid and low latitude peregrines in North America were apparently the victims of chemical poisoning (Hickey 1969) and are now practically nonexistent as a breeding species. Bartonek *et al.* (1971) have pointed out that the construction phase per se would probably have less impact on birds in general than would other phases of the use of oil resources. In agreement with Bartonek *et al.* (*op. cit.*) we (White and Streater 1971; White and Ray, Ms) have suggested that the threat to raptors also lies mainly after the construction phase and after the Arctic has been "opened up" to other forms of exploitation and to the general populus. This is especially true once the construction of roads, and the activity provided for by roads, is complete. The presence of human activity could have particularly severe impact in local areas where the fate of the populations is already questionable (one such population will be discussed under problems caused by chemicals). The exploration, has, however, provided us with excellent opportunity to survey heretofore unaccessible regions and usually, at least on a

one-to-one basis, help and cooperation from oil companies has been generously offered.

### *Chemical Poisoning*

Although there are still battles raging as to the real or imaginary impact of chemicals on raptor populations, particularly the chlorinated hydrocarbons, it seems to me that the data have clearly identified a cause-and-effect relationship between declining raptor populations and the combined effects of these chemicals. The best documentation of this problem has probably been that of Ratcliffe (1970, 1972) for the British Isles although Cade *et al.* (1971) and Peakall (1974) have clearly identified the impact of DDE residues on eggshells in Arctic North American hawks and falcons. Further, the relationship between eggshell thinning and lowered production in falcons has been established (Enderson and Berger 1970). In my short time as a field biologist I have observed local populations dwindle to the point of near disappearance. Other than my witness to the near total disappearance of the peregrine falcon in Utah (Porter and White, 1973), perhaps the decline of the local peregrine falcon population along the Colville River of Alaska is as foreboding as any. Much of the history of this population has been given (White and Cade 1971), and recent events there are being analyzed (Peakall, D. B., T. J. Cade, C. M. White, and J. R. Haugh, Ms.). Briefly stated, in 1952 about 36 pairs of peregrines bred on a 183 mile stretch of the Colville River. In 1967-1969 the number varied between 28 and 33 pairs and production of young was still within normal limits though the chlorinated hydrocarbon levels were high (Lincer *et al.* 1970) and eggshells showed thinning. By 1971 only 25 pairs were occupying cliffs and productivity was only 0.56 young per nesting attempt or about half of normal, and eggshell thickness continued to decrease (about 30 percent from normal) (White and Cade 1971). In 1973 John Haugh found only 14 pairs with just four nests producing for an average of about 0.64 young per nesting attempt. Only 39 percent of the peregrines known to have formerly been on the river remain today and production is less than half of what it must be to maintain a viable population. If production continues at the current rate, the complete demise of that population can be predicted to occur within a short time.

The sequence of events we are now witnessing in the Arctic is that which has been seen elsewhere prior to the loss of a population (Hickey 1969). It would appear that this "chemical disease" will be around and affecting birds for years to come and, as far as the peregrine is concerned, the continued use of some chlorinated hydrocarbons is still a looming threat to the species' continued existence in the western U.S. Special permissions have been applied for to use DDT to control the outbreak of tussock moth (*Hermerocampa pseudotsugata*) on Forest Service lands in certain parts of the Pacific Northwest. Here is the interface of conflict within agencies: On or adjacent to the lands where spraying is requested exists less than a handful of the remnant western peregrines, and all governmental agencies are charged with the protection of this endangered species on lands under their control. Should the spraying be allowed, it would only worsen the status of these few remaining falcons. Furthermore, spraying would only be an expedient, temporary control of a forest pest that is cyclic in its years of serious outbreak. The spraying would not terminate the threat of another outbreak by simply controlling the current one.



Are we willing for the sake of expedient control to hasten the extinction of another species? We should be reminded that extinction of a species such as the peregrine is a final condition, but even with spraying we will witness continued successive outbreaks of the moth. Is the threat of the termination of a species worth the temporary control of another?

On the bright side, however, the British workers have noted an increase in inland breeding peregrines (Ratcliffe, pers. comm.) since the ban in that country of the offending chemical, but the coastal population now may be further declining owing to additional pollutants such as the polychlorinated biphenyls (Ratcliffe, 1972).

### *Other Problems*

A constant problem is that of educating the public. This is particularly critical in the western U.S. where many a young lad with a gun thinks he is still "winning the west." During the legal upland game bird season many rough-legged hawks (*Buteo lagopus*) on their winter visit to Utah (White 1969) are shot by the roadside. Henny and Wight (1972) have concluded that shooting pressures may have been an important depressant of Cooper's hawk (*Accipiter cooperi*) populations in the eastern U.S. One of the real black marks on the record of the United States was the maintenance of a bounty system on bald eagles between 1917 and 1952 in Alaska. During that time about 128,273 eagles were killed and over \$133,000 spent by the Government in bounty payments (F. Robards, pers. comm.). Now that we have stopped such bounties and overcome many biases caused by ignorance, we need to stay alert to prevent any such further happenings. Greater effort needs to be expended by local law enforcement agencies in prosecuting the game law violators since man often learns best from example. Greater cooperation needs to exist between universities, state and federal wildlife resource agencies, and conservation agencies in relying on conventional propaganda methods—the mass media—for educating the public.

At least one species, the monkey-eating eagle (*Pithecophaga jefferyi*) of the Philippines is threatened with extinction not only by deforestation of the habitat, but by traffic for zoos and hunting trophies (Brown and Amadon 1968). It seems a paradox to suggest that if habitat encroachment continues in the Philippines and this eagle continues to decrease in the wild, it may be that it will be saved as a species only by captive breeding efforts.

Electrocution of large raptors, particularly eagles, is now recognized as a rather frequent problem in the west (Smith and Murphy 1972). For example, Morlan Nelson, Boise, Idaho, recently counted 22 dead golden eagles along only 26 miles of power lines in Oregon in one single survey (Nelson, pers. comm.). One segment of power lines in Beaver County, Utah, has killed at least 47 golden eagles (Smith and Murphy, *op. cit.*). The numbers of golden eagles that are killed annually in the western states by electrocution may exceed several hundred. Through the efforts of Morlan Nelson, working with the Idaho Power Company, solutions to this problem are being successfully determined. Nelson has estimated that about 95 percent of the electrocutions could be prevented by correcting 2 percent of the poles carrying 69,000 volts or less.

Falconry is a consumptive use of raptors. We lack hard data, however, on the

real impact or magnitude of effect of this sport on populations or species of raptors. Because so much emotionalism is attached to falconry, much of what we know is hearsay information making the facts very elusive items to evaluate.

### **Solutions, Mitigative Measures, and Current Work**

For each of the above problems there is perhaps a precise solution, but one which may have only restricted applicability, and rather than addressing myself to them in a stepwise fashion, I am more concerned with presenting an overview of the various projects or methods being employed to enhance the status of raptor populations in general. Some of the research needs in reestablishing raptor populations have already been alluded to (Nelson, 1969). Before proceeding it should be mentioned that one of the more significant events in coming to grips with these multiple problems was the convening of a Conference of Raptor Conversation Techniques on 22-25 March, 1973, at Fort Collins, Colorado. Some participants came from as far as East Africa. Additionally, the National Audubon Society hosted a conference on 13-15 February 1974 to discuss critical problems and guidelines for the implementation of a peregrine recovery program with a staff member of the British Nature Conservancy in attendance. Many of the techniques discussed at that conference are similar to those presented here.

#### *Nesting Habitat Modifications*

The Canadian Wildlife Service has engaged in a most rewarding nest site augmentation study over the last few years. Because the high banks of some rivers in Alberta are composed largely of clays and sands, they are subject to rapid erosion and the nest sites on them are ephemeral in nature. Most of the nesting sites are a mere ledge or "pot hole" in the bank. In 1970, wildlife personnel dug five holes on one river in southcentral Alberta. Four were occupied by prairie falcons. In 1971 twelve more holes were excavated and 10 were occupied—two by the Canada goose (*Branta canadensis*), one by a peregrine falcon and seven by prairie falcons. In 1972 and 1973 more than 100 holes were dug into banks, and at least 25 were occupied by pairs of prairie falcons and 12 by Canada geese. Those areas where holes were occupied were adjacent to regions with nesting populations of both species or where former nest sites had existed. Clearly, in those areas where holes were occupied, one factor limiting population density was the availability of nesting habitat rather than food or some other factor. It will be instructive to see what new limits of population density will be obtained under these conditions.

In addition to holes in riverbanks, platforms with nests have been erected in both the U.S. and Canada. Structures erected in Canada were made of 2-by-2-inch weld wire bases with sticks woven into the wire to form a nest and were placed a few feet off the ground. Of five erected in 1971 five were occupied by the ferruginous hawk (*Buteo regalis*) and four were successful in producing young. A similar effort, just to mention one of the many, was tried by the Bureau of Land Management in Utah. In western Utah there are vast sagebrush flats which contain high densities of jackrabbits, but the nearest mountains with nesting cliffs for golden eagles are far removed. Because the

valleys are flat, they are essentially devoid of hunting perches. Thus, the rabbit population receives very little eagle predation pressure, and it is essentially a food resource remaining untapped by eagles. In 1972 in this area, BLM personnel erected eight towers about 16 feet tall with a platform approximately 4 by 4 feet on top. All were used for feeding perches by numerous eagles the first year they were erected and sticks were carried to three as though there was attempted nesting, presumably based upon observations of them, by young eagles. Whether or not these will ultimately be used for nesting remains to be seen, but certainly the additional food source now more readily available and vulnerable to young eagles may help to offset juvenile mortality.

#### *Artificially Increased Nestling Survival*

Frequently in large birds of prey, especially in the African eagles, two eggs are laid and two young hatch but only one survives, one being killed by its larger sibling. The killing of one young by the other when they are still only several days old has been termed the "Cain and Abel conflict." This conflict is well documented by Gargett (1971) in the black eagle (*Aquila verreauxii*) of Africa. The "Cain and Abel" behavior is not seen in older, partly feathered siblings. On the assumption that once beyond some critical developmental stage the young are compatible, Valerie Gargett and associates undertook some nestling manipulation studies with black eagles in the Matopos region, Rhodesia. The basis of the experiment was to remove one of the two young from the nest shortly after birth and raise it by hand at Ms. Gargett's residence. The young were swapped at regular intervals, each having its alternate turn both in the nest and being raised by hand. Once beyond the stage where fighting occurred both young were left in the nest to be raised by the parents. In these experiments two young, rather than one, were successfully raised in each nest (W. Spofford, pers. comm.).

Many such techniques could probably be successfully employed under circumstances where they seem warranted. Prudence should be used, however, in efforts to increase the population size of species that may already be stable within the constraints of the environmental carrying capacity. It would seem to be both a waste of effort and money to try to increase a falcon population, for example, if its total range were already occupied and the density saturated within that range by the number allowable at its current carrying capacity. This would especially be applicable to those species that are largely nonmigratory. Juvenile mortality would simply increase to offset increased production, and the excess young produced would be for naught and, in fact, may temporarily add increased burden to the habitat.

#### *Egg Substitution and Manipulation*

One technique not yet fully explored is the manipulation of clutch size, or egg substitution within wild populations. This method may prove especially useful in populations where the production of young has been decreased or altered through chemical contamination. At least one such effort is currently being employed in osprey populations along the Atlantic coast. Paul Spitzer has successfully transported eggs from osprey populations in the Chesapeake Bay area where they have low levels of chlorinated hydrocarbons and normal

production to nests of ospreys in Connecticut where production is practically nonexistent because of high chemical residue levels in the adults. By taking eggs promptly after the clutch is completed the donor adults lay a second clutch which they then raise. Young raised by the recipient adults return to the area in which they were raised. Some are now at breeding age and are making pair bonds. In this fashion then, one population is essentially producing young for two populations. The eventual goal is the replacement of contaminated adults in the breeding population by healthy foster young containing low contamination levels. The success of such a program depends upon the assumption that environmental contamination levels have stabilized or are lowering so as not to recontaminate the local populations.

Such a program may also prove useful in the reintroduction attempts with large falcons. Eggs laid by captive peregrine falcons might well be placed under foster wild prairie falcons to be hatched and the fledglings returned to the wild. Prior to such attempts, however, studies need to be done under controlled conditions to determine if young falcons so raised will recognize and interact normally with conspecifics rather than the foster species. This might also work in reverse by causing wild populations to produce double clutches. First clutches could be removed and reared in captivity and second clutches left to be raised in the wild. The fact that most wild raptors will lay two or even three clutches of eggs if the first one is taken promptly after completion was well known by egg collectors and is an adequately documented fact.

### *Captive Breeding*

Captive breeding of raptors is proving very successful not only by private individuals and organizations and government agencies, but also in zoological gardens (Lucas 1970; Cade 1973). Heretofore, the peregrine falcon was thought to be one of the more difficult species to raise. In North America alone about 30 young were produced in captive breeding projects in 1973. Aside from peregrines a variety of other falcons, hawks, and eagles were produced in 1973. Attempts with captive breeding of owls seem to be largely confined to zoos, probably because many fewer species are apparently having productivity problems in the wild. The large scale breeding of raptors will hopefully prove to be mainly a matter of techniques and methodology, such as incubation temperatures, pen sizes, nesting substratum, etc. The aims of breeding are primarily to obtain stocks for reintroduction into the wild and to provide stocks for use in captive situations, thereby reducing the demand on the exploitation of wild populations. These goals can probably be achieved within the next decade if the success of 1973 is any indication of the future.

Policy for reintroduction of species into their former ranges has yet to be decided upon and must be worked out in cooperation with federal, state, and private institutions and agencies. It is only through the concerned and integrated cooperation of such organizations that success in the future may be assured. Unfortunately, sometimes the appropriate state or federal agency (and also private organization) personnel with the responsibility of making final decisions present the image of being more concerned with personal gratification and public opinion than the welfare of the species under their charge, but this tendency is gradually lessening.

### *Population Marking*

Before any sound management policies can be established, certain statistics about the population must be known. Unfortunately all too few are known for any one raptor species. In an attempt to at least answer some of these questions about peregrine falcons, an ambitious color banding scheme has been started by Prescott Ward of the Edgewood Army Arsenal. The goal of the program is to have discrete population units marked with a different color band. The origins of birds seen in migration can then be more readily determined and the overall picture of migration patterns more completely conceptualized. Hopefully we will then better understand the reasons why local populations, such as that of the Colville River, show severe declining trends while other not too distant populations appear to be doing well. It is probably related in some way to the location of local wintering grounds.

### **Conclusions**

From a present assessment of wild populations of raptors, it is clear that in their position as top carnivores in food webs they are exposed to a variety of environmental disturbances that have lesser effect on species at other ecological levels. Further, because they are predators, they must also cope with the biases of man. As a result of many combined effects, raptors in general are not doing as well as they might, ecologically speaking. In the foregoing discussion I have tried to assess some of the reasons for their poor state and present some of the possible methods that might be used to correct the general deterioration of populations. Most of the methods that seem available are not unique to problem solving in raptors, but rather they are principles that apply to most wildlife populations. Certainly the Hawaiian goose (*Branta sandvicensis*) is being restored to its former range through the same methods that will seemingly work with raptors.

Raptors appear to be most affected by habitat destruction, which in turn reduces food supply and/or exposes them to the direct pressure of human presence, by the demoralizing effects of chemical poisons, and lastly by the persistent persecution or exploitation of them by man.

As the human population continues to grow, there is probably little that can be done to totally stop exploitation of remote habitats or alteration of environments such as drainage of swamps, construction of dams, etc. We can, however, restrict the wholesale development of certain areas. Also, we can develop more ecologically compatible chemicals to use in industry and agriculture. Certainly we can educate the public.

The methods of increasing population density are already developed and seem to lie mainly in techniques of creating additional nesting or feeding habitats or improving existing ones as is being done in Canada, or in the manipulation of nesting biology to produce more young. In areas where raptors have been eliminated, the appropriate management method seems to be reintroduction by transplanting birds from healthy wild populations or from captive bred stocks. However, for any or all of the available methods to become a reality, there needs to be total cooperation between those truly concerned with the survival of this group of birds. New protocols may have to be established and existing ones discarded and the unified goal of survival of the

species will have to take precedence. If man is honest in his commitment to the continued existence of a quality ecosystem and the maintenance of diversity within that system, then here is one place where he may bring that commitment to fruition.

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## Discussion

MR. MIKE KOCKERT [Snake River Birds of Prey Natural Area, Boise, Idaho]: I would like to comment on Dr. White's mention of predator-prey relationships and to show some things we observed in the Birds of Prey area in relation to golden eagle and jackrabbit relationships.

In 1971, apparently there was a peak in the jack-rabbit population. From 1971 to 1973, we observed almost a tenfold decrease in the number of jackrabbits. The production of young eagles declined and adults occupying territories had reduced almost by fifty percent. This was aggravated by almost fifty percent of the birds not even laying eggs. So apparently the response, especially in eagles, to a lower prey base is just nonbreeding of the adult birds, similar to the pesticide disease syndromes.

DR. WHITE: I think this simply points up the importance that we, as individuals concerned with the quality of the ecosystem, look at land-use practices. This is about as important as anything we can do for birds of prey. Certainly if the prey base is not there, the birds of prey are not there.

MR. GLENN SAUNDERS [Illinois Natural History Survey]: I would like to urge especially in endangered species, that we extend our concern from the species to the population. I hope we will go slowly, so long as we have even a remnant of native population, about introducing other stocks of animals raised in captivity or even eggs from one area to another, because we will be diluting the genetic stock. I believe that these populations are equally important as species. Once we completely lose a native population, then I see nothing to lose about trying to reintroduce another strain because it is already gone. Let's go slowly and let's give very serious consideration to populations of endangered species as well as species.

DR. WHITE: Yes, that is a point very well taken. In fact, there seem to be two sides to this issue. One is that by introducing other stocks, we increase the gene variability and vitality through hybridization. This is yet to be demonstrated, but it is certainly a point to be considered.

One thing that impressed me in the discussion yesterday is that trumpeter swans from the time they were first introduced to Malheur until they had their first successful breeding was nineteen years. If this happens with raptors, there will probably be a lot of discouraged people.

However, this is a very well-taken point and I think more data need to be available as to the real impact of mixing genetic stocks.

DR. ADLER: You mentioned a relationship between the prey species and the raptorial species in Idaho. Have you noticed any adverse relationships between terrestrial predators using the same prey species and the raptor?

DR. WHITE: Perhaps Mr. Kockert from Idaho would have something to say. But I don't think our data could support or suggest it one way or the other. I don't know.

MR. MIKE KOCKERT [Idaho]: At the moment we don't have any positive data on this. With our proposed research, we hope to get at this situation. Bobcats and coyotes prey on jackrabbits, as do golden eagles and prairie falcons, and badgers apparently prey very heavily on ground squirrels. In the next three or four years, we may be able to get at this problem. But at the moment, we can only speculate.

MR. JOE MURPHY [Brigham Young University]: Our studies on other large raptors particularly ferruginous hawks and great horned owls indicate that they suffer too. They also depend upon the jackrabbit, although there may be an age class discrimination in those individuals taken.

It should also be pointed out that the increased predation on livestock by raptors seems to be related to this rapid decline in prey as well. For the first time last year, we found several lambs in golden eagle nests. We don't know how they got there, but we assume the eagles brought them there. But we don't know what state they were in when they were brought there.

Then, of course, it is tempting to suggest, and perhaps it should be suggested, that when you lose the normal prey base—in this case, rabbits for coyotes, then it is not too surprising that an increase in lamb loss might be expected, particularly when you have an animal that is so vulnerable to coyote predation. You couldn't design a more vulnerable animal for coyote predation if you worked for years than our famous western range maggot.

CHAIRMAN WAGNER: We at Utah State University have been working on jackrabbit-coyote relationships for about twelve years now. We saw the same jackrabbit population decline, starting about 1971, which the gentleman from Idaho reported. Jackrabbits hit a very low point in calendar 1973 and in that same year the coyote population, which had built up to the highest level we had seen it in the time we had worked on it during 1972, dropped by about half. So it is quite evident that the coyote populations are rising and falling with the rise and fall of the food base. I have seen similar evidence in the kit fox in western Utah. In general, from so much of the predator research that is taking place right now, one is impressed with the growing evidence of the importance of the size of the food base in determining the size of the predator population. And it is encouraging and interesting to see these studies, such as Mr. White's, that are pointing toward positive programs for managing predators, looking beyond simply the passive action of providing protection to what environmental enhancement is needed in terms of habitat and land management which will provide the prey species that will enable predator populations to survive in numbers.



# Wolf Management in Minnesota: An Endangered Species Case History

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In 1849 the Minnesota State Legislature established a wolf (*Canis lupus lycaon*) bounty that, with one exception, was renewed biennially for the next 116 years. Over that interim the bounty, loosely regulated sport hunting and trapping, and the efforts of game wardens to control wolf numbers in their districts comprised the wolf management program of the state's Conservation Department. Despite a near total lack of protection and public attitudes that were strongly anti-wolf, wolves persisted in northern Minnesota while they were being extirpated elsewhere, mainly because sizeable tracts of semi-wilderness habitat existed in which the wolf could find relative security. Minnesota's wolf population and its habitat became a southern extension of similar, vast areas in southwestern Ontario.

Data on wolf density, reproduction and mortality are lacking for the early years but Olson (1938) subjectively estimated that 250 wolves occupied 2500 square miles of wilderness in the Superior National Forest during the late 1930's. Stenlund (1955) conducted the first extensive studies of Minnesota's wolves during the late 1940's and early 1950's. He delineated a 12,000 square mile primary wolf range in the state and identified portions of 17 counties totalling some 24,000 square miles in which wolves occurred. Stenlund used subjective methods based on observations of warden-pilots, private pilots and trappers to derive a population estimate of  $240 \pm 35$  wolves on 4100 square miles of the Superior National Forest. A similar wolf density was postulated for an additional 3000 square miles of primary wolf range comprising portions of three northeastern Minnesota counties. The resulting population estimate of 300-400 wolves on 29 percent of the total Minnesota wolf range was widely publicized and has been occasionally misinterpreted (*cf* Mech 1966:2) as representing the total, state-wide wolf population.

Stenlund (1955) reported a state-wide wolf harvest of about 300 annually during the early 1950's. He felt that the average annual take of about 100 wolves on the Superior National Forest represented the annual surplus. The wolf population trend on the Forest was apparently stable from 1948 to 1953 but wolf numbers were reduced from those typical of the World War II era (Stenlund 1955).

During the 1950's and early 1960's the bounty remained in effect despite growing disenchantment with it. An average of 188 wolves per year were bountied (Mech 1970a) at 35 dollars each during this period. No data are available to determine the effect of the bounty take on wolf numbers, but annual harvests did not fluctuate widely and a sustained yield system of cropping seemed to be in effect (Nelson 1971).

By 1965 anti-bounty sentiments were sufficiently strong to enable Governor

Rolvaag to veto the bounty appropriations bill despite strong support for it in the state legislature. Efforts to revive the bounty narrowly failed during the 1967 legislative session. The state-wide bounty, clearly the most extensive wolf management tool ever used in Minnesota, came to an end on June 30, 1965.

### **The Post-Bounty Years**

Anti-wolf feelings surfaced during the period 1965-1968 in the form of backlash land-posting programs to protest loss of the bounty, numerous letters to the editors of Twin Cities newspapers, and protests at the Capitol featuring frozen carcasses of trapped wolves. These efforts helped promote a directed predator control program initiated by the legislature in 1969, but probably served mainly to unite the opponents of a state-wide bounty so as to negate the prospects of ever reinstating it. Under the control program of 1969 wolves taking domestic livestock could be bountied by certified trappers. The magnitude of the bounty payments, number of wolves removed annually, and system of designating eligible trappers were at the discretion of the state's Conservation Commissioner.

Following termination of the bounty, wolves expanded their peripheral range southward in northcentral Minnesota (Nelson 1971). In retrospect, it now appears that the bounty suppressed wolf densities in the primary range as well; by 1970 portions of the primary range harbored one wolf per 5.3 square miles (Van Ballenberghe 1972). Virtually no areas on the Superior National Forest exhibited an absence of wolves during the late 1960's and wolves or their signs were commonly seen near human habitations throughout northern Minnesota. Such observations were not the rule during the height of the bounty years.

As wolf numbers increased throughout northern Minnesota the state's deer herd declined drastically, as did hunter success. The state-wide deer kill exceeded 95,000 during 10 consecutive years, 1959-1968, but dropped to 68,000 (Gunvalson 1971) following the severe winter of 1968-69 (Mech and Frenzel 1971). By 1970, with the season reduced to two days in the northern zones, the take fell to 45,000 deer. In 1971, the season was closed (Gunvalson 1971). The ecological causes of the decline apparently were related to successional changes within the aspen forests typical of the Lake States (Byelich *et al.* 1972). Such changes have not yet stopped and deer numbers continue to decline throughout portions of the major wolf range (Mech 1973). The role of the wolf in accelerating this decline has not been fully evaluated.

The ecological changes that characterized Minnesota's wolves and their habitat during the 1960's were outranked in management significance, however, by other national trends that began during the same period. These trends served to publicize the ecology and management of the wolf in North America and to bring the wolf's status in Minnesota before the public eye.

A survey conducted during the early 1960's on the status of wolves in North America found, despite the absence of good data, that wolves in Minnesota were "at best, barely reproducing themselves" (Cahalane 1964:8). The same survey classified the wolf as truly in danger of extinction. Similar fears were voiced in numerous other scientific and popular books and articles published during the 1960's including *The World of the Wolf* in which Rutter and Pimlott

(1968:171) expressed uncertainty about the prospects of the wolf surviving in the United States. During the same period the Isle Royale studies were widely publicized (Allen and Mech 1963) and served to acquaint large numbers of people with the role of the wolf in natural ecosystems. Several authors who reached large numbers of people (Mowat 1963, Hellmuth 1964, Crisler 1968) ably combined the wolf's rarity and positive ecological values with anthropomorphic traits and thus converted thousands of readers to emotional supporters of the wolf.

In 1967 the Secretary of the Interior classified the eastern timber wolf as an endangered species, one whose prospects of survival and reproduction were in immediate jeopardy. The eastern subspecies had appeared in the first Red Book of rare and endangered fish and wildlife of the United States (U.S. Bureau of Sport Fisheries and Wildlife 1966). The Red Book data sheet indicated that the subspecies was greatly reduced in range and numbers in the conterminous United States. The total Minnesota wolf population was reported to be 300-400 individuals and most other wolf subspecies, except those in Alaska, were reported as similarly reduced and endangered. The 1968 edition of the Red Book contained identical statements.

The reasons for granting the eastern timber wolf endangered status are not entirely clear. By 1967 Stenlund's (1955) subjective population estimates were out of date but no additional research indicating a reduced population had been conducted. Removal of the bounty, the only Red Book management suggestion applicable to the Minnesota wolf population, had been accomplished. Although the eastern subspecies was reduced to three percent of its former range, range reduction had not occurred suddenly and the only objective measure of the subspecies' prospects for complete extirpation was the status and trend of the Minnesota population. In retrospect, the status of that population was never more secure than in 1967. Goodwin and Denson (1971) apparently recognized this when they suggested that the wolf, like the grizzly bear (*Ursus horribilis*) could be removed from the endangered list during future revisions.

Subsequent to the endangered classification of Minnesota's wolf population, several international conservation organizations such as the International Union for the Conservation of Nature, the World Wildlife Fund and the New York Zoological Society took an active interest in that population and its protection. Both the popular and scientific literature (Rutter and Pimlott 1968, Mech 1970b) continued to stress the precarious status of Minnesota's wolves. The validity of the 1968 Red Book population estimate for Minnesota's wolves and its implications for their management were suggested (Mech 1970a).

In November 1969, a pro-wolf documentary was telecast nationwide. It depicted various scenes of wolves being shot from aircraft and suggested that hunting and trapping were driving wolves to extinction. Public concern for the wolf was adequate to generate 3000 letters to the U.S. Fish and Wildlife Service demanding a stop to the wolf slaughter in Minnesota and Alaska. Apparently, many believed the threat of extirpation for Minnesota's wolves was no longer a theoretical possibility based on little data; it was an imminent certainty if total protection was not forthcoming. Similar attitudes toward the fate of the entire North American wolf population were evident by the early 1970's (Lerza 1972).

The most comprehensive book on wolf ecology and behavior ever published (Mech 1970b) appeared in 1970 with a title implying that all wolves, not just the eastern subspecies, were endangered.

### **State and Federal Management Efforts**

Prior to 1970, the role of state or federal natural resource agencies in sponsoring wolf research, devising management plans for the Minnesota wolf population, or providing protective regulations was minimal. Leirfallom (1970) assured the participants of a 1970 wolf management symposium that Minnesota did indeed have a wolf management plan and was conducting annual wolf censuses. Neither, however, was intensive enough to provide the type of ecological data necessary to formulate management strategies. Due partly to the state's inaction (Rupp 1970), the Supervisor of the Superior National Forest acted unilaterally in November 1970 to close the Forest to the taking of wolves. His actions were legally justified under provisions of the 1966 Endangered Species Act and accompanying regulations of the Secretary of Agriculture that pertained to the protection of the habitat of endangered species on federal lands. The primary reasons given for the closure were increased trapping pressure and deteriorating quality of wolf habitat on the Forest (Rupp 1970). The Forest Supervisor's actions were widely publicized by several national conservation organizations including the National Audubon Society (1971) which strongly commended the closure order.

Closure of the Forest prompted efforts to produce a management plan for the wolf acceptable to the Minnesota Department of Natural Resources, the U.S. Forest Service and the U.S. Bureau of Sport Fisheries and Wildlife. Shortly after the closure order, the Forest Service produced a proposed management plan that reiterated the potential for overharvest of wolves on the Forest and stressed the shrinkage of their habitat. However, data on wolf population density, exploitation rates, reproduction or extent of habitat loss were not presented. The plan called for a 3600-square mile sanctuary zone (70 percent of the Forest) including federal lands and state, county and private inholdings on which sport hunting or trapping would be prohibited.

A series of inter-agency meetings was held in 1970 and 1971 to discuss these and other proposals but agreement between agencies could not be reached and no cooperative wolf management plan was assembled. Early in 1972 a committee was appointed to discuss the preliminary results of two separate wolf ecology research projects begun in 1968 on the Superior National Forest. The committee was charged with the responsibility of drafting an acceptable management plan based on the research findings.

The effects of the closure order on the population dynamics of wolves in the Superior National Forest have been partially evaluated as a result of wolf research results published subsequently. Mech (1973) presented data indicating a stable wolf population on the Forest during the six winters from 1966-67 through 1971-72. The wolf population density approached one per ten square miles on the Forest during this period, a density among the highest reported in the literature (Mech 1970b). If wolves on the Forest were suppressed by overexploitation prior to 1970 they evidently failed to respond during the two whelping seasons following the closure order.

There is some evidence that the traditionally anti-wolf public attitudes of many Minnesotans changed appreciably during the closure period. A pro-wolf group, Help Our Wolves Live (HOWL) grew in strength and lobbied intensively for protective legislation for the wolf in Minnesota's 1971 legislative session. That session passed without the introduction of a state-wide wolf bounty bill, the first such occurrence in the state's history. In contrast, bills were sponsored in 1971 to designate the wolf, rather than the gopher, as the official state animal. By December 1972, 57 percent of 1000 Minnesota residents polled by the Minneapolis *Tribune* favored a proposal to allow wolf hunting if a refuge area was established.

In April 1972, the committee charged with producing a Minnesota wolf management plan agreed on harvest regulations similar to those proposed by Nelson (1971) and recommended a wolf sanctuary area of 2350 square miles in the primary wolf range adjacent to Canada. The proposed plan suggested a maximum harvest of 150-200 wolves per year with a five and one-half month closed season throughout the entire range of the wolf in the state and encouraged continued research and habitat improvement for the wolf and its prey species. In August 1972, the plan was approved and signed by the Commissioner of the Minnesota Department of Natural Resources, the Supervisor of the Superior National Forest and Regional Director of the Bureau of Sport Fisheries and Wildlife. Authority for the Commissioner to implement the regulations specified in the plan awaited action by the 1973 session of the state legislature.

Wolf protectionist groups denounced the plan claiming it would decimate the last remaining wolves in the contiguous 48 states (Regenstein 1972, Purrett 1972). One report (Lerza 1972:5) indicated that "the wolf has already been decimated to the point where only 5400 are left on the North American continent." East (1973) reported that opposition to the plan was largely emotional and based on ecological half-truths and misinformation.

In December 1972, the U.S. Department of the Interior publicly withdrew its support for the Minnesota wolf management plan. Interior suggested that it could not condone a plan that allowed harvest of an endangered species but could only support a moratorium on wolf harvests until a recovery plan for the eastern subspecies had been completed. Several organizations including the National Audubon Society (1973) and the Fund for Animals (Purrett 1972) lauded Interior's action. The primary effect of that action was to insure the defeat of the management plan by the Minnesota State Legislature (East 1973) and to leave the wolf population in five-sixths of the wolf range in the state without any management or protection for the foreseeable future. One year after Interior announced its decision the recovery plan was still not available and no efforts had been made by the state to modify the proposed plan of management.

The ecological data necessary to devise rational management strategies for wolves in the Superior National Forest began to appear in 1971 (Mech and Frenzel 1971). Mech (1970a) suggested that the most critical management questions centered around the size of that population as well as the total number of wolves in the state. Data bearing on those parameters was not published until December 1973 (Mech 1973), one to three years after some critical, unilateral management actions had already been taken.

The data of Mech and Frenzel (1971), Van Ballenberghe (1972) and Mech (1973) allowed an accurate population estimate for wolves in the Superior National Forest during the winters of 1971-72 and 1972-73. Mech (1973) calculated the forest-wide wolf population as  $405 \pm 20$  and  $388 \pm 14$ , respectively, during those years. These estimates were based on intensive radiotelemetry studies of 21 different wolf packs occupying discrete, adjacent territories comprising 1650 square miles (39 percent) of the Forest. These data indicated the occurrence of about 45 breeding wolf packs residing in one-sixth of the total wolf range of the state.

From 1971-72 to 1972-73, Mech (1973) documented a decline of 15 percent for seven wolf packs in the interior of the wolf census area and correlated the decline with a diminishing deer population. Mech speculated that the wolf decline would spread to other areas in the Forest as the carrying capacity for deer continued to fall. It is noteworthy that the wolf population calculated to exist in the Superior National Forest in the early 1970's would have to decline 40 percent forest-wide to reach the density estimated by Stenlund (1955) twenty years earlier. Stenlund recognized that wolf and deer populations in the wilderness portion of the Forest had historically been much lower than those of perimeter areas. It is likely that a similar pattern will prevail into the future if extensive fires are not prescribed or do not occur naturally.

### **Present Management — Future Options**

Currently, therefore, a dense but declining wolf population occurs in the Superior National Forest. The 1970 closure order remains in effect in the Forest but wolves are still harvested there both on federal lands and nonfederal inholdings (Van Ballenberghe 1972). Forest Service reports (1972) indicate that 38 wolves were taken in the Forest in fiscal 1972, a harvest not significantly lower than that typical of the late 1960's. The ability of the Forest Service to enforce the closure order seems limited; only one case was prosecuted during the first three years of the harvest ban. The current level of exploitation, even if it represents a most conservative estimate, has a negligible effect on wolf numbers.

On the remaining 20,000 square miles of wolf range in Minnesota wolves may be harvested in unlimited numbers during any season. Under directed predator control about 100 wolves preying on domestic livestock are removed annually. Sport trapping, private control measures and wolves shot incidental to other hunting activities probably account for an additional 100-200 wolves per year. Throughout much of the peripheral wolf range wolves are exploited heavily but dispersing individuals fill the void after travelling in excess of 100 miles from the saturated primary range (Mech 1973).

The management options currently available for the Minnesota wolf population are limited. The current situation, *i.e.* no deliberate effort to manage the species or its habitat, could probably be maintained indefinitely without jeopardizing the maintenance of wolves in the state. Clearly, the status of the species in Minnesota is more secure now than it was during the 1940's and 1950's. The current system, however, encourages northern Minnesota residents to kill wolves as they see fit, stifles any real efforts toward long-term habitat

improvements in the primary range and irritates those who have moral objections to the concept of harvesting wolves that are totally unprotected.

A second alternative is implementation of the 1972 Minnesota wolf management plan thus declaring the wolf a game animal and establishing state-wide regulations on its harvest. This would accentuate the positive values of the wolf by providing it with substantially more protection than it currently has. It would allow for a precise estimate of the annual take, encourage sport harvest of depredating wolves in peripheral areas, and provide a permanent sanctuary area where wolves could be seen, heard or studied in their native, unexploited condition. Most importantly, this plan could settle the rift between state and federal agencies with wolf management authority. The necessary data are now available to convince those who oppose the plan of its merits.

The Endangered Species Act of 1973 provides a third alternative for Minnesota's wolves — that of total protection. This could be achieved either by retaining the wolf on the endangered species list or by invoking the similarity of appearance provision in the act. This clause prohibits trade in pelts if two species, one not on the endangered list, so closely resemble each other that hides of the species cannot be differentiated. Obviously, pelts of red wolves (*Canis niger*), northern Rocky Mountain wolves (*Canis lupus irremotus*), eastern timber wolves, or any of several nonendangered wolf subspecies appear identical. Under the new act if, upon consultation with the state, Minnesota's wolves are classed as threatened (a species likely to become endangered in the foreseeable future in all or a significant portion of its range) the Secretary of the Interior may still choose to totally protect them if he deems their current protection inadequate.

Although legitimate moral objections to the hunting or trapping of wolves may exist, I believe total protection for Minnesota's wolves is the least favorable management alternative. It encourages those who lose livestock (including dogs and cats) and those who remain convinced that wolves exterminate deer to control wolves through any available means, including poison. Wolf populations, not simply individuals, must be controlled in peripheral areas to prevent massive, negative attitudes toward the wolf from recurring, thus setting back progress in Minnesota wolf management to pre-1965 levels. Clearly, the best way to achieve the necessary population reduction in the peripheral range is through sport hunting and trapping as practiced throughout northern Minnesota since statehood.

Timber wolves persist in northern Minnesota today despite direct efforts to exterminate them and misguided efforts to protect them that resulted in no protection at all. Their management has been complicated by those who could not distinguish between a species' place in the Red Book and a realistic, ecological evaluation of its prospects for survival. Fortunately, the wolf is an example of an adaptable, resilient species that persists despite the management schemes applied to it.

The last chapter in the case history of Minnesota wolf management is not yet written, for it deals with the future. The wolves of Minnesota are a unique example of an endangered species population on which adequate data now exist to devise intelligent management strategies. It is still uncertain whether those data will be used to reflect well on the competence of natural resource

managers or will be ignored in favor of management by emotion rather than ecological realities.

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## Discussion

MR. ROGER CONNOR [Rocky Mountain National Park]: I would like to ask if you have any comments on the recent reintroduction of wolves into northern Michigan.

DR. VAN BALLENGERGHE: As you point out, wolves have been released into Northern Michigan. A pack of four was released on March 12. That release was enthusiastically supported by many individuals but I am somewhat less enthusiastic. I don't feel that the pre-release investigations were adequately done from several standpoints. One, there is some reason to believe that wolves already occur in the Upper Peninsula of Michigan, and perhaps we ought to identify where they are and why they are not doing better before we stick four more wolves in there. Secondly, there is substantial local opposition in the U. P. to the introduction of wolves, and I, personally, would not force an introduction before I did the adequate selling job that it involves. If there is one thing to learn from Minnesota case history it is that simple protection isn't enough. You've got to have public support.

A third reservation is that the transplant was done allegedly as part of a recovery plan for the eastern subspecies and the recovery plan is not out yet. It has not been subjected to public comment. I haven't seen it. It has only been seven years since the wolf was on the endangered species list, and I would think that sooner or later we could have a recovery plan for it. So it occurs to me that if that transplant was made as part of the recovery plan, it is sort of like putting the car in gear before the motor is started.

I am not totally unenthusiastic about it. I just think it was a little premature.

MR. BOB HERBST [Commissioner of Natural Resources, Minnesota]: First, Vic, I compliment you on the paper and also thank you for the research that you provided for the State of Minnesota. The next paragraph should be that the wolf is now off the unprotected species list in Minnesota. The legislation last Friday evening in the dying minutes of the session gave the Commissioners the authority to manage all unprotected species.

DISCUSSION LEADER JANTZEN: Thank you, Bob. That was welcome news.

MR. TOM TOWNSEND [Ohio State University]: Is there any active deer management on the Superior forest to presumably help manage the wolves in that area?

DR. VAN BALLEMBERGHE: There is some deer habitat management on the forests. It had, I would say, a rather negligible influence on the wolves there. I think it is important to get involved in it in a big way. There seems to be a feeling in this country that for endangered species we need more federal planning and we need more decisions made in Washington, D. C., in order to help endangered species. I feel very strongly that that is probably the last thing we need and that what we need is work where the endangered species are, on their habitat to ensure their perpetuation. In the case of the wolf, I feel that the status of that species is secure in Minnesota, regardless of what we do. That seems obvious. The wolf is still there. If our activities were influencing it to the point where it was in danger, it would probably be gone.

But you do bring up an important point and it is one thing that has to be done if we are to maintain higher wolf numbers in the future.

MR. DEAN PURCELL [Minnesota]: I would like to point out that our state has cooperative agreements with the Superior National Forest and we have done some forest wildlife habitat improvement primarily to help deer, and of course, when we have deer we have the timber wolf because that is their primary food.

Also, there has been a marked upsurge in commercial cutting of timber in the Superior National Forest and throughout Northern Minnesota, and this will have beneficial effects on the deer herd and, in turn, on the timber wolf.

DR. VAN BALLEMBERGHE: About a third of the Superior National Forest, about a million acres, is the Boundary Waters Canoe Area, which is a wilderness area in which logging activities are on the downswing. It is in the BWCA—the wilderness portion of the forest—where the wolf is declining due to the decline of deer numbers. In the peripheral areas of the forest, logging activities are on the upswing and probably the wolf picture there is brighter than it is in the interior.

MR. BOB GOLDEN [Fort Collins, Colorado]: Has any information on the ecological data prior to 1971 been at hand?

DR. VAN BALLEMBERGHE: Milt Stenlund in 1955 published a study on Minnesota's wolves. Between the time of that study and the late 1960's, there is virtually no data on

the population. Then in the late 1960's and continuing to the present, there has been a rather intensive research effort.

We do have a rather complex and sophisticated set of data on that population on portions of the forest now.

MR. JAY CRAVENS [Regional Forester, Eastern Region]: I am responsible for Superior National Forest. I, too, compliment you on your very fine presentation.

I might say that the federal land-use planning and the resource planning take some of the measures that have been recommended here into full consideration. We fully consider deer management and wolf management in the development of our resource plans. The timber management plan, for example, provides for the age-class distribution that is so vital.

It is also significant to note, Vic, that they have been stopped in federal court from cutting timber in some of the prime deer and wolf range in the Superior National Forest. That is currently undergoing an appeal in the appellate court in St. Louis. This will have some bearing on some of the decisions that will be made in the management plan that we have under preparation for the Boundary Waters Canoe Area. We have completed a draft management plan and a draft environmental statement and we are presently working on the final management plan and the final environmental statement. But these are some of the decisions that we have to make, and research such as yours is very helpful to us in helping to make these decisions.

MR. STEVE CAMPBELL [Denver, Colorado]: Wasn't the fact that the Governor vetoed the bounty bill in Minnesota also a factor in his defeat in the next election?

DR. VAN BALLENGERGHE: There have been claims to that effect. I don't think anyone has ever fully substantiated them.

MR. PURCELL [Minnesota]: I will comment on that question. It contributed to his loss

DISCUSSION LEADER JANTZEN: We have time for one more question.

MR. HERB CONNELLY [Fort Collins, Colorado]: In your mention of areas that need further investigation before further transplants are attempted, aside from the public relations problem, what do you think are the areas that do need further study before other attempts are made at reintroductions?

DR. VAN BALLENERGHE: Well, as I indicated, in the case of Michigan, we have some evidence to believe that wolves already occur in the U. P. in rather small numbers. And I think, first of all, before we set additional wolves in there, we ought to find out where they are, what they are doing and why they are not doing better than they are.

Secondly, I think we ought to have a look at the wild canids that are already there: in the case of Michigan, the coyotes; in the case of the Northeast, coyote and wolf hybrids. I think we ought to consider how their presence and abundance might dilute the gene pool of those wolves that are introduced. There is some evidence that the wolves in eastern Ontario hybridize with coyotes rather substantially and what ends up is neither a wolf nor a coyote. One of the risks we run in sticking wolves into an area that has a high coyote population and very few wolves is hybridization.

We should survey the prey base very carefully to see that we have a sufficient prey base to support the population of wolves, if that is our goal in the introduction. We ought to look at ecological changes within the vegetation that the prey base depends upon to see what the long-term outlook is. I foresee a whole list of sociological as well as ecological pre-survey investigations.

# Institutional Inputs for Cheetah Conservation in Africa

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## Introduction

A two-year survey into the status of cheetah (*Acinonyx jubatus*) throughout Africa south of the Sahara shows that the species has been reduced to vulnerable status (Myers 1974a). The cheetah is limited in its distribution to savannah and semi-arid ecotopes, which means that even one hundred years ago only around one quarter of sub-Saharan Africa offered favorable or moderate habitats. By contrast, the lion (*Panthera leo*) probably ranged in good numbers across at least half of sub-Saharan Africa, and the leopard (*Panthera pardus*) across pretty well all of it. Accelerating attritive pressures on the cheetah's habitat have reduced it to its present straits, and will bring it under further threat in the years ahead. The principal threats derive from expanding human populations with expanding aspirations, as human communities migrate from overloaded fertile areas into the next most suitable habitats for human settlement, savannah ecotopes. The cheetah's ethological attributes reinforce its ecological limitations, leaving it little tolerant of man and his activities.

As of now there are almost certainly fewer than 25,000 cheetah in Africa, possibly as few as 10,000. Whichever figure one accepts, it is probably round-about half what there were in 1960. The next decade could see the present figure reduced by half. All too soon the cheetah could face a situation akin to that of the Bengal tiger (*Panthera tigris tigris*) in Asia, reduced to a final 2,000. A significant difference lies in the fact that the cheetah needs much larger areas to ensure viable populations, due to its low densities even in optimal-seeming habitats—generally 1 animal to 25 or 30 square miles at best, while in moderately suitable habitats a density of 1 to 100-300 square miles is not uncommon. In contrast to the tiger, the cheetah is singularly susceptible to a variety of limiting factors, such as disease, carnivore competition, shifts in prey community make-up and changes in vegetation configuration. In several parts of Southern Africa, for example, a spread of bush growth in response to environmental dessication inhibits the cheetah's hunting style as well as its favored open-habitat prey species. Conversely, bush encroachment favors the leopard, which possibly leads to the leopard appropriating more cheetah kills than before and inflicting intensified predation on cheetah cubs if not on adult cheetah.

Africa south of the Sahara contains parks and reserves covering 150,000 square miles, an area half as large again as Colorado. Not all of them are likely to survive as viable self-sustaining eco-units, due to environmental perturbation in the hinterland zones (Myers 1972). Even if they were all to survive, they would extend protection to only 3,000 cheetah at most, since only one third or

so feature appreciable numbers of cheetah. In any case, were the cheetah to be reduced to isolated populations it would become far more vulnerable than any other of Africa's great predators, except possibly the wild dog (*Lycaon pictus*), to localized extinction through the spectrum of limiting factors noted above.

### Strategies for Threatened Species

The cheetah's status implies a radical reorientation of protective strategies if the species is not to become threatened and endangered within the next few years.<sup>1</sup> This is not to say that the methods applied hitherto for certain species have not worked well in many cases. The World Wildlife Fund and similar organizations have performed an exceptional job since 1960 in safeguarding species under threat. Often they have achieved the objective by protecting a swamp, or a patch of forest, or by reducing poaching. But, without wishing to denigrate the magnitude of their achievement, this amounts to a "band-aid" strategy; it compensates for or reduces direct depredations by man, as has worked for the black rhinoceros (*Diceros bicornis*), or it protects certain segments of habitat, as has worked for the white rhinoceros (*Ceratotherium simum*).

The cheetah, being a wide-ranging animal and thin in numbers at the best of times, does not lend itself to this approach; rather it faces a situation postulating broader requirements. To this extent, it displays problems which will be presented by various other species with extensive needs, as natural environments become disturbed throughout almost the entire extent of Africa. The cheetah thus serves as a paradigmatic illustration of the expanded approach required. Patching-up to compensate for deficiencies in the ways human communities regulate their affairs could prove less capable of meeting the needs of the situation. What is required is a fundamental evaluation of several of society's institutions, with a re-structuring of certain present methods of regulating society's transactions. This predicates the introduction of new institutions geared to future imperatives of safeguarding threatened species.

The analysis that follows examines some of the problems and possibilities of the situation. Far from producing a series of solutions, it draws attention to the sorts of directions which conservationists might investigate. It does not formulate specific techniques for devising methodologies; instead it presents new ways of looking at a problem which grows more pervasive and complex. While not aiming at instant answers, it tries to define some questions—which in itself is sometimes part way to an answer.

#### *The Cheetah as a Common Property Resource*

The institutional inputs should cover economic, social, cultural, legal and political factors. From this premise, there is need to identify the nature of the "goods and services" represented by the cheetah—both the cheetah as individual animals and as a species.

In several respects, the cheetah can be categorized as a common property resource, likewise as a collective good and to some extent as a public good

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<sup>1</sup>Maintaining a gene pool in zoos seems an unlikely prospect, since the cheetah has hitherto proved very reluctant to breed in captivity.

(Myers 1974b). It affords benefits to many people, since the welfare of people in North America and Europe seems to be enhanced by the knowledge that the cheetah is still alive and well and living in Africa. When one person enjoys this benefit, he does not detract from another person's enjoyment in North America and Europe. Similarly, if he goes to Africa on safari and views the cheetah through his camera rangefinder, this does not generally constrict the opportunity for somebody else to do the same. If the resource is properly regulated, the safarist who views the cheetah down the sights of his sportman's rifle does not engage in a consumptive form of exploitation of the cheetah as a species.<sup>2</sup>

An individual cheetah may be said to belong in part to the rancher on whose land it perhaps commits depredations, insofar as the rancher is able to assert some degree of "property rights" over it while it is on his ranch. At the same time, according to law in African countries where wildlife is viewed as a national resource, the same cheetah belongs to the national community within which the ranch is situated. At the same time, again, the cheetah by tradition and by cultural perception adheres to Africa as part of the continent's natural heritage. Some people believe that the cheetah likewise "belongs" to the world community as part of mankind's patrimony. So, for purposes of conservation, the cheetah should perhaps be considered as belonging to everybody—as long as this is not understood to mean that it belongs to nobody, with responsibility for its conservation going by default.

This is more than abstract ratiocination. Property rights imply responsibilities. If property rights are to be allocated, can responsibilities be likewise apportioned and integrated to work in mutually supportive fashion? The answer to this complex situation is not yet clear, though some preliminary guidelines have been established by those countries which assume responsibility for the northern fur seal (*Callorhinus ursinus*), with several countries on the producer list and several countries on the consumer side (Ray 1971; Ray and Norris 1972). Certain aspects of ocean fisheries present precedents through semi-parallel situations, with reference to in-shore fisheries and deep sea mammals such as the great whales (Christy 1972).

#### *Marketplace Evaluation of the Cheetah.*

Having attributed property rights, and thereby some measure of legal status, the way may be partially cleared for establishing "market value." This is not to say that a broad highway for specific conservation methodologies will have been opened up. Rather, directions for analysis will have been identified and defined for purposes of formulating policy.

In any case, this approach serves only to supplement, not to supplant, traditional methods of safeguarding threatened species through "purist" evaluation which postulates that a species is a priceless asset (not the same as price-less). Within the context of market values, the cheetah frequently encounters problems of survival because of competitive land-use practices in its

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<sup>2</sup>For the sake of "public relations" impact on Africans, hunters of the great felids in Africa would do well to confine themselves to lion and leopard.

habitats. The market pays profits for these land usages; nothing is paid for the cheetah, except where it helps to swell tourist earnings in parks and reserves. While it is possible to attribute an approximation of market value to a wildland area by virtue of visitor earnings (see, for example, Coomber and Biswas 1973; Cicchetti *et al.* 1969, and Pearse 1968), it would be inordinately difficult to do this for a park in Africa with regard to a principal, but by no means the only, wildlife attraction.<sup>3</sup> In any case, as indicated earlier, a protectionist strategy for the cheetah cannot depend on protected areas and similar foci of tourist interest. Rather, it must ensure survival for broad gene pools across more extensive tracts of wildland Africa than are accommodated in parks and reserves.

### *Land Usage in Savannah Africa*

The principal problem is thus the conflict between wildlife interests and the spectrum of usages to which man wishes to put savannah lands in emergent Africa. In southern Kenya and northern Tanzania, this latter means upgraded stock-rearing by modernized Masai, struggling to compete in commercial markets. In Somalia and lowland Ethiopia, it means subsistence pastoralism by herdsmen who steadily reduce the biotic productivity of the ecotopes—whether for domestic or wild herbivores, or for wild predators. In the Sahel zone it means nomadic stock-husbandry by starving Tuareg and other tribesmen, who usually show little interest in wildlife but are driven in their present straits to killing gazelle (*Gazella* spp.) for food and cheetah for the money to be made out of its spotted fur. In Rhodesia, Namibia and South Africa, it means established ranching by stockmen who apply intensified methods at a time when shrinking profit margins require that ranchers derive maximum financial benefit from every last head of stock on their holdings; where they may have been ignorant of occasional losses to predators or may have been prepared to ignore them in the past, their reaction now is inclined to match the indiscriminate response and prejudiced spirit which characterize livestock activities in other parts of the world.

In each of these instances, rangelands produce goods and services which evoke a sensitive index of their worth in the marketplace. Everybody is pretty much agreed on the worth of a pound of beef, and everybody is pretty much inclined to utilize the pricing systems established. No such sensitive structures exist by which people can express their evaluation of the cheetah. Even more to the point, some sort of marketplace system to reflect the cheetah's "value" is needed to reflect the value *at the margin*: just as the measure of the rancher's

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<sup>3</sup>Notwithstanding what was said above about the tourist who derives benefit from the cheetah by enjoying it through his camera viewfinder, tourism utilization can be a consumptive form of wildlife use. In Serengeti Park in Tanzania, tourist trucks harass cheetah so frequently that kill sequences are disrupted, and cheetah occasionally starve. In Amboseli Park in Kenya, close tailing of cheetah family groups has resulted in the mother fleeing across the plain to avoid pursuit, whereupon the cubs are lost. The cheetah regrettably does not lend itself to the form of tourist facility which helps to save the tiger in India, viz. a "Tiger-Tops" locality where spectators view the tigers from a night-time lookout lodge.

livestock loss to predators should be the incremental benefit he would derive if his calf or sheep remained alive, so the conservationist's dollar evaluation of the cheetah should reflect whether he is talking about the last 20,000, or the last 2,000, or the last 2.

By extension, an evaluation of the cheetah through, say, tourist revenues derived from all parks and reserves which feature cheetah (if such an evaluation could be achieved) would ignore the cheetah's worth as an extant species, *i.e.* its value to science apart from other "uses." By the same token, it would grossly underestimate the worth of the cheetah to say that the hides of the last 20,000 individuals would be worth \$200 per unit (the going price to the bush dealer in Africa), *viz.* \$4,000,000. Conversely, it is absurdly inaccurate to say that the cheetah's worth as a species is somehow beyond value: it is certainly not worth the Gross Product of savannahland Africa, no more than the Grand Canyon in undisturbed state is worth the Gross Product of Colorado and Arizona, let alone of the United States.

### *Cost-Benefit Relationships*

After determining some preliminary approximation of the value of an individual cheetah, in itself and as part of the species, it is necessary to devise some institutional framework by which the parties to the cost-benefit relationship can get together in some putative marketplace to engage in adjustment transactions. This is difficult enough inside the United States, where the would-be protectors of the cougar (*Felis concolor*) and the coyote (*Canis latrans*) have little enough opportunity to arrange their affairs *vis-à-vis* the ranching community. It is all the more difficult when the main beneficiaries of the cheetah's continued existence are, by and large, people in North America and Europe, given the present state of wilderness perception on the part of communities in North America, and Europe and Africa. Conversely, the people who bear a cost by virtue of the cheetah's continued existence are almost entirely in Africa. More than that, they belong to a sector of the community in Africa which generally benefits little from tourism (Myers 1974c), however much equity and efficiency might require that this segment of the community benefit before all others. Thus, the cost-benefit construct concerns not only whether benefits outweigh costs, but how these costs and benefits are distributed. This perspective of the issue has clear though complex implications for the relationships between the developed world and emergent Africa.

### *Strategic Areas*

Further considerations arise with regard to identifying areas of special significance to the cheetah's survival. This refers to extensive tracts of wildland Africa outside parks and reserves. Optimal-seeming localities are difficult to identify, given our present state of knowledge concerning the cheetah's requirements. But perhaps in the long term it could become advisable to concentrate on the more suitable areas, and to recognise in effect that the costs of preserving the cheetah in other areas could prove disproportionately heavy. If the cheetah could be protected in northern Kenya, Namibia, Botswana and

parts of the Sahel (supposing that fragile zone ever recovers from its present degradation), this would extend protection to perhaps 7,000 cheetah. It would also protect sufficiently large populations to permit genetic exchange, and to ensure against disease and other catastrophies.

The particular costs and benefits associated with each area would vary, according to the opportunity costs involved. Livestock raising is a major industry in Namibia, of moderate though expanding consequence in Botswana, and of significance in the Sahel only as a means of subsistence which could perhaps find some substitute in drought-resistant crops. Thus, to attribute particular emphasis to specific areas implies a need to focus on the inter-relationships of joint-product forms of land use.<sup>4</sup> Cheetah conservation is competitive with some types of land use, though not always conclusively competitive. With other forms of land use, it is complementary, and to others it reveals a neutral relationship. Each combination of circumstances deserves assessment on its own merits, within the framework outlined above.

## Conclusion

The several components of this approach may sound complicated to a degree. Against this, it should be recognised that a rudimentary form of cost-benefit analysis is applied by the Masai, by the ranchers of Southern Africa, and by the Tuareg in the Sahel, who weigh—and weight—the pros and cons of living with the cheetah as a factor in daily life. They may not have heard of cost-benefit analysis, but, like Molière's gentleman who spoke prose without ever realising his capacity, they subject the cheetah's survival to an analytical evaluation where the magnitude of costs and benefits, together with their distribution, are assessed in terms of the individual's narrow perspective. The same applies to the notion of property rights in a common property resource, as to a range of related factors. The perspective should, of course, be expanded to consider the needs and rights of society at large, not only society at present but in the future.

The kind of evaluation proposed in this paper should be applied in spirit rather than in detail; it is a way of looking at the problem. When these implicit considerations of cheetah conservation are taken into explicit account in policy analysis, the new perspectives can be used as a guideline framework for formulating conservation programmes.

If that sounds speculative at best and wishy-washy at worst, one might consider the options available. At present, given the capacity of our institutions to express our preferences for goods without price, or property rights, we in effect suggest that we are pretty indifferent whether the cheetah survives or not.

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<sup>4</sup>For an illustration of this approach, see Bishop (1972) with regard to the California condor.



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## Discussion

MR. STEVE CAMPBELL [Denver, Colorado]: I think we are all aware of the cheetah in Africa, but I think the danger elsewhere is more critical. Do you have any numbers of cheetah, for example, in Russia and northeastern Iran, Afghanistan, Pakistan, Jordan, Saudi Arabia, and so forth? If so, do these governments have enough money to help the cheetahs, and, if not, which governments do not have enough money to help the cheetahs?

DR. MYERS: In response to that question, we have here at this conference Dr. Farvar from Iran. I am sure he could be more explicit than I. Iran is the one non-African country with any sizable cheetah population. They have several hundred as a minimum and they have made a considerable comeback in the last fifteen years, probably through the regulation of poaching and the regulation of grazing and competitive activities on the part of domestic livestock.

Saudi Arabia and Jordan, I would surmise, have as many as a hundred all put together.

MR. CAMPBELL: Could you also give a breakdown in Kenya of the reasons for the decline of the cheetah through habitat loss, poaching, any trophy hunting, diseases, and so on?

DR. MYERS: Certainly hunting is a negligible factor. Maybe fifty per year are taken, but it is peanuts compared to the overall situation. The international fur trade has not really helped. But it isn't nearly such a big factor in the decline of the cheetah as have been habitat loss and the reduction of the cheetah's life support systems in ranching country. Cattle ranches are becoming much more extensive. We now have ranching in areas where there were no cattle two years ago. At the same time, ranchers are having to operate on a narrowing profit margin, so they have an incentive to make their operations much more intensive. They put the squeeze on the cheetah and on other predators. What I say about cheetahs applies similarly to lions, leopards, hyenas, wild dogs, and wild horses.

MR. CAMPBELL: Finally, what is your feeling as to captive populations as opposed to natural rearing? And if you agree with this method of raising cheetahs, do you have any suggestions for zoos, and so forth, around the country?

DR. MYERS: There are those in this country who have tried for many years to get cheetah to breed in zoos. Regrettably, these are largely failures. There have been one or two minor successes, but nobody can really isolate the reasons. I think it would be a very high risk strategy to put any part of the cheetah survival funds into captive breeding programs.

MR. JOHN GRANDY [National Parks and Conservation Association, Washington]: To what extent do you see the New World Heritage Trust and the World Heritage Trust Fund alleviating some of the problems and providing some incentive for the maintenance of habitat?

DR. MYERS: It is a very important question, but regrettably I don't see the World Heritage Trust assisting the cheetah much at all. The World Heritage Trust tends to deal kindly with spectacular, unique biotypes, a limited number of parks and reserves in the whole of Africa, but the Sahel has about two hundred cheetah for 10,000 square miles. So we know we aren't going to help the cheetah at all very much.

MR. JO STUCKER [Boulder, Colorado]: Can cheetah skins be legally sold in East Africa now?

DR. MYERS: No, they may not. One or two still leave the country each year, but not nearly so many as leopard skins. This is more of a peripheral factor in the cheetah's status.

MR. BOB HUGHES [Sierra Club]: Dr. Myers is the author of a number of what I would consider very advanced and very fine theories. I would just like to call your attention to his book, *The Long African Day*. I think we will all benefit very much from reading that book and considering the many questions that he asks for which apparently nobody has the answers, and some of the solutions to some of the problems of Africa that he sets forth.

DISCUSSION LEADER JANTZEN: Do the political leaders of the developing nations consider the North American and the European interests in the cheetah as interference, so to speak, in their business?

DR. MYERS: This is a very important question. The new nations of Africa are very sensitive to what they would construe as outside interference, even though the outside contribution of ideas, whatever might be offered, was with the very best intentions. This is a very sensitive issue. By and large, national leaders like President Nyerere of Tanzania and President Kenyatta of Kenya don't mistake the intention or the motivation. But the public at large, especially in a country like Tanzania, is rather sensitive to what they feel is overfrequent reminders from the outside that Africa's wildlife does not belong to Africa alone. As a Tanzanian once expressed it to me, "People in the United States don't know Tanzania and they go on making a lot of noise. Why don't they preserve the San Francisco cable cars better?"

That is a little basic. You may not agree with it. But it helps a good deal if you listen to their standpoint and try to see their point of view a little more.

DISCUSSION LEADER JANTZEN: There is some research going on in an FAO project under Wendell Swank in Nairobi designed to see what the protein production would be with proper management of the native wildlife species as compared to utilizing the same ground for the production of protein with domestic livestock.

If that research does show the protein production to be higher in the case of the wild animals, will it be accepted and, if so, do you think that would help the cheetah?

DR. MYERS: When this fine project in Nairobi has come to a boil, then we should soon have an answer on whether wild protein is competitive with domestic protein. The problem of what to do with wild predators is a tangled one. If ten percent of Swank's potential profits are whistling down the throats of cheetahs or lions, he might have to take a decision to recommend the removal of wild predators on Masai ranches where he is operating. I know there are several factors at issue here. If you remove the predators, we might get disease among the wild herd populations. We all have these problems, of course.

With regard to the cheetah, one of the species which Swank would particularly want to crop pretty intensively is the gazelle. The gazelle produces twice a year and it has a very considerable turnover. It reaches maturity in just a few months. You could get a tremendous harvest of protein from gazelle populations. If the gazelle disappears, the cheetah is going to be in real trouble. It cannot compete with the lions and the larger carnivores whose prey are just too big for the cheetah.

MR. BOB HUGHES [Sierra Club]: Leaving the cheetah for a moment, from the information that has been reaching us, the leopard is apparently much more plentiful and much more widespread than previously known and probably no longer belongs, from what we hear, on the endangered species list. If we are going to keep the endangered species list honest, of course, we would have to move to see that it comes off.

What kind of pressure can the leopard stand and still remain off those lists in the future?

DR. MYERS: The leopard can withstand very extraordinary pressure from normal forms of hunting. The one agent that it cannot withstand is poison and poison is now being very widely used in Africa. That is the one factor which can clobber the leopard in just a few years.

A report in *The New York Times* about six weeks back suggested, as a consequence of this survey, that the leopard was "very abundant in the rural country of Africa south of the Sahara." In point of fact, out of the forty countries involved, the leopard has disappeared or has been virtually eliminated from twenty out of the forty. In another fifteen, the leopard has been clobbered in very sensitive areas and has been depleted, often unnecessarily, because of the international fur trade which has been ecologically and economically inefficient to an absurd degree.

But in Tanzania and two small adjacent countries, in the rain forest country of the Tanzania Basin, an area of about a million square miles which is like the United States west of Denver, I think, the leopard there has reached high density. There are a quarter million leopards in that rain forest and they seem to be secure for quite a few years to come.

So in some countries, you must designate the leopard as endangered if it has not already disappeared. In a few countries, they are in very good straits.

MR. RON TAYLOR [York University, Ontario, Canada]: I had some experience in East Africa some years ago and knew several farmers who managed to ranch both antelopes as well as cattle. There is a possibility in many places where one could have the wild antelopes, the wild predators and the beef cattle. You can, in fact, obtain far more protein from a particular area with wild grazing animals than you could if you intensively used cattle on the area.

DR. MYERS: This would serve the cheetah pretty well. But, regrettably, wild predators are getting such a bad image in developing Africa now that most ranchers are not prepared to act in a 100 percent rational fashion. And in that respect, I say that there are one or two precedents in other parts of the world for them.

I would suggest that if we really want to do some further research on what would keep the cheetah alive, we shouldn't have any more ecological studies; we should have a sociologist trying to find out what goes on in the minds of some of those ranchers.



# TECHNICAL SESSION

Wednesday Morning—April 3

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## Achieving Balanced Considerations In Public Lands Programs

*Chairman:*

WILLIAM E. TOWELL

Executive Vice President, American Forestry Association, Washington, D.C.

*Discussion Leader:*

FLETCHER NEWBY

Executive Director, Environmental Quality Council, Helena, Montana

## Remarks of the Chairman

William E. Towell

What we are talking about here today represents the most important need in the conservation environmental field today and that is the need to achieve balance.

It seems as though everything we do, every problem we encounter, is one of finding the proper balance—a balance between use and preservation of resources—a balance between energy supply and energy use or conservation.

As a matter of fact, the whole definition of conservation itself involves the balanced use of resources in order to achieve the highest quality of living.

Our focus today is going to be primarily on the public lands. This does not mean that the principles discussed do not have equal application to private lands, but each of the speakers is directing his remarks primarily at one or more phases of public lands use and public land management.

In order to demonstrate our search for balance, I think we have put together a well-balanced presentation of public lands problems.

For example, our first paper is going to be on Forestry Policy and Planning, our second paper will be on Wildlife Habitat, our third will be on the National Forest System, our fourth will be on Recreation, specifically on off-the-road vehicles, and then we are going to have a presentation on the lands of Alaska and then we are going to end up with mineral developments on public lands.

We have tried, in relation to this session today, to indicate a balance between the various problems we encounter on our public lands.

# A View of Current Forest Policy, With Questions Regarding the Future State of Forests and Criteria of Management

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## **Introduction**

This paper is an attempt to identify current forest policy, to identify the strengths and weaknesses of this policy, and to formulate a strategy of policy making which will alleviate the essential weaknesses which we observe. This topic is currently very popular, but our reading does not reassure us that the current directions are favorable. In fact, there seems an increasingly greater emphasis on exploitation, and an increasingly strong movement away from basic conservation principles. There are exceptions to this, but nowhere does there seem to be a coherent conservative overview of a long range program. We believe there is legitimate cause for concern, and we suggest positive directions of response to this concern.

We have arrived at our present position from several independent starts and it might be helpful to the audience if we sketch one such train of thought. Some of our colleagues in Oregon are studying the northern spotted owl. This owl is a creature of old growth Douglas-fir forests, and is so dependent on old growth that it does not nest elsewhere. Thus the concern of the future of the spotted owl resolves into a concern about the future of old growth forest. That the problem is acute is brought clearly home by some of the records of Eric Forsman, Department of Fisheries and Wildlife, Oregon State University. During the past three years, he has mapped the habitats of 81 pairs of spotted owls. Fifty percent of these have been cut, or will be cut in the next five years, according to timber management plans. By any criterion this is a high rate of attrition.

But to approach this concern from the point of view of spotted owl management is to make the same mistake that is made when one considers an old growth stand as only fit for a "regeneration treatment." Isolated into one-on-one conflict with timber needs, the spotted owl cannot be expected to fare well, and anyway this just isn't the right way to go about the problem. The spotted owl, timber production and old growth should, along with many other elements, be considered part of the total forest system, and management questions directed to the forest as a whole, rather than to the individual parts. We can't properly make a decision whether or not to cut a particular piece of old growth unless we know a great deal about the relationship of this particular piece to the rest of the forest.

In fact, we discover the same problems in attempting to make this decision one parcel at a time that we found in addressing one element at a time. Some of the questions relate to a higher organizational level, and some to the particular parcel of forest, and they cannot be treated at the same level. Only

after the regional level decision has been made regarding how much timber land will be saved in the form of old growth, and in whatever variety and spatial distribution, can a meaningful appraisal be made of the local question, whether or not to save a particular parcel.

But such regional consideration cannot be made without inputs regarding the distribution and properties of the old growth (or other forest element), and many of these properties are stand dependent. In many senses, each stand is unique. If a particular old growth stand is converted, then its unique properties are destroyed, but other unique properties are generated. It is necessary to evaluate the unique stand properties, but in *both* the regional and local context, in order to make a good decision.

In our concern for the future of the spotted owl, we reasoned thusly, and attempted to determine the present status of old growth, and the plans for its conversion and perpetuation. We were very disconcerted to find that the information does not seem to be available. Even on national forests, there seem to be no records regarding the current status, distribution and logging plans for timber stands, by age and characteristics. There *are* underway new accounting systems in which this presumably will be available, but now, in 1974, forest planning apparently does not have the benefit of this kind of data base.

What then, we asked, is the current basis for forest management on the national forests? What is the policy according to which cuts are allocated and the face of the forest is modified? What will this forest, or that, look like in 50 years? 100? Will there be conditions existing which provide for the spotted owl? Again, there really doesn't seem to be any proper basis for such a perspective, much less for this specific answer. Current operating policy is implicit. It must be induced from interpretation of operating rules, like *allowable cut*. It is also expressed by maxims like "old growth should be converted into productive forest as soon as possible." This provides neither specification of reserve, nor rate of conversion . . . topics on which widely varying opinion is evident.

Further, we find that the concept of *allowable cut* is variously interpreted, with curious results, and on examination, that most if not all of the prevailing management dogma derives from the indiscriminate application of economic formulae to forest problems. That is, we find that the current thinking does not include the *basis* for an acceptable long range forest policy, so that when the new information systems become available, there is no reason to suppose that they will be used in a manner which we deem desirable.

We see an acute need, then, for a directed effort towards development of a long range strategy of forest management, such that out of this strategy will come policies and operating procedures which will have foreseeable consequences. We want to be able to ask, "What is the future of the spotted owl in Oregon?" and obtain a meaningful answer. Society may decide that something else is more important than the spotted owl, and preclude its future from the long range plans, but we must have a strategy in which this decision will be explicit, and conscious, not implicit and unrecognized.

We want to be able to ask "What will the forests of Oregon look like in 2074?" and obtain a meaningful answer. And we want the citizens of Oregon in 2074 to have the opinion that we, in charge of the forests in 1974, left things in good shape for them. Further, we would like to be able to leave some of the

choices to them, like whether or not provision is made for the survival of the spotted owl.

### **A Search for a National Forest Policy**

When we couldn't find local plans which specified the future state of the forest resource, we began to search for national or regional policy which would implicitly provide such a specification. For the national forests, *The Multiple Use-Sustained Yield Act* (Public Law 86-517) provides the official policy. We are not aware of any formal statements providing policy for other public lands, or national policy for private lands. All of these, and also the national forests, in implementation of the MUSY Act, seem to be governed by a set of maxims, most of which derive from, or are modified by, economic maxims.

The MUSY Act is an exemplary document, which might well form the base for a General National Forest Policy. From the paragraph defining multiple use: ". . . harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, 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." But we are not aware of any document which fleshes out this act into a working policy. Its concepts are apparent in many places, but the principle of *multiple use* seems to be yielding to that of *dominant use*.

There are many reasons why such a trend is not unexpected. Commercial tree species are ecological dominants, and the activities associated with utilization of them totally dominate an area. Further, the activities associated with *management* of commercial species dominate management activities, and lead to increased ecological dominance by the commercially important species. The upshot is that timber management tends to *dominate* all areas that are capable of timber production, with other uses (say wilderness) restricted to unproductive sites.

Without taking a position on this situation, we can observe that it is in violation of the spirit of the MUSY Act, if not its letter, and suggest that a reaffirmation of that act, perhaps with a broader orientation, is in order. It is our hope that some of the later developments of this paper can contribute to this direction.

The concept of sustained yield is implemented most commonly by the identification of *allowable cut*, this being the calculated harvest which will, by one criterion or another, provide for perpetuation of the forest. The literature is confused and a number of formulae are used in various contexts. Most of the confusion, and difference in the results of the formulae, results from the fact that the existing "age distributions" of forests in question do not conform to an equilibrium condition. Thus, a formula based on a particular rotation age, with equal acreage harvested each year, and with older stands taken first, will lead to perpetuation of cycles of feast and famine under many different distributions of present age. Yet, in a uniform site and with an even age distribution over the desired rotation, the area formulae will yield the identical results as the Hanzlik formula (and others). However, the Hanzlik formula has better properties



when applied to an uneven current age distribution and is more commonly used, apparently for this reason.

Neff (1973) describes the rationale of the Hanzlik formula and Emergency Directive #16 (Anon 1973) summarizes Forest Service policy on allowable cut. Basically, this follows the rule:

$$\text{allowable cut} = \frac{\text{inventory to be liquidated}}{\text{years allowed for liquidation}} + \frac{\text{annual increment}}{\text{of growth.}}$$

On the surface, this formula appears to be fundamentally sound. It is in the various interpretations of the elements of this equation that much of the prevailing confusion arises. Simply interpreted, "inventory to be liquidated" is old growth that is to be cut and added to the regeneration category, and "annual increment" is the actual growth achieved on the lands which have already been converted. A somewhat more general interpretation of "inventory" does not materially affect the concept, but it is important to note that this category essentially represents the existing stands beyond rotation age which are to be "converted."

In "annual increment of growth," however, we find a term which is interpreted very disturbingly: (1) All of the allowable cut computed from the growth increment is taken from "over age" stands, which in effect violates the stated conversion period. (2) It is common practice to calculate not only the *achieved growth* of the under age stands, but the "expected" average growth of all such stands over the defined rotation age, and then take this inflated amount from the over age stands. (3) It is occasionally the practice for an *intended* management practice or cultural benefit to be charged to allowable cut *before this has been put into practice or demonstrated*. That is, if it is our *intent* to reforest an area, then its average rotation production is immediately added to allowable cut.

Typical of the general confusion is "Emergency Directive #16," which seems to give conflicting direction on the last point, and there are evidences that this practice is still followed. The first two points are a little less obvious but are still undesirable. To illustrate, suppose that we do reforest a large area which has been in unproductive brush land. Then by (2) we can, in the first year after planting, charge the average rotation production of this area to the allowable cut. This is really not much different from the practice of charging this a year earlier on intent.

Thus, the practice of taking older stands first, plus the practice of charging future predicted growth to allowable cut, particularly when this prediction is on the basis of anticipated gains from planned intensification of management, seems to place allowable cut in a very dubious position. It is possible to manipulate the allowable cut, just by reorganizing forest lands into management units in which old growth stands are paired with young stands which have a "good" future, which future is cashed in by cutting the old growth.

This phenomenon has been labeled *The Allowable Cut Effect* and actually seems to have been touted as a means of maintaining an economically desirable regime of timber production while playing the conservation game (Schweitzer *et al.* 1972). Whatever their motive, this is the effect of application of the

allowable cut formula in the manner they describe. Teeguarden's (1973) reply to this paper is to the point.

It is as though the profit motive is so overriding that it corrupts every attempt to impose a saner, resource-need perspective on forest management. The allowable cut effect is simply a means of circumventing the decisions which were made in formulating the allowable cut, and to prevent this we must insist that those decisions be explicitly stated and followed until explicitly changed. We must also insist that, if a rule such as an allowable cut rule is to be used, it be defined in such a manner that it cannot be manipulated by changing the boundaries of management units.

Several expository studies have recently been made of timber supply, of which we can cite the *Douglas Fir Timber Supply Study*. This study has caused a great deal of consternation among the fraternity—it apparently is the first evidence that has been received regarding the greatly reduced availability of timber in the future. Interestingly, it took nearly five years for the concerns to surface, and new studies are being initiated to validate the results of the first. This is all evidence that we are not only horribly ignorant of the direction in which we are heading, but are also horribly secure in this ignorance. The simple rules by which we calculate allowable cut *must* lead to a pattern of high cuts now and lower cuts later, and all of the devious ways of adding in anticipated growth rates from unproven intensification of management and genetic improvement just compound the problem. We do not need a great simulation study to show the pattern we have chosen—it follows simply from our method of calculation and the rationale behind it.

This rationale is the criterion of *present value*, the economic yardstick by which alternate management plans are commonly compared. An excellent illustration of the way this operates is the paper by Rickard *et al.* (1967). It is apparent that the operating maxim "cut old growth as soon as possible" is not based on any concept of timber production but rather on the simple economic rule that ungrowing capital must be converted into dollars. Rickard has another paper (1970) in which this concept is even more apparent. In this paper he explicitly equates (1) a growing tree to growing money in the bank, and (2) standing value of timber to capital investment. Now we can see that a private landowner must sometimes take this position but, from a societal point of view, this perspective ignores the dependence of society on the resource base.

Yet it is exactly the perspective that standing trees are *investments* and tree growth is investment growth that is the basis of the *present value* criterion for choosing among alternatives. And this criterion is the basis for the operating maxims (1) cut mature timber as soon as possible, and (2) cut growing stands when their growth rate falls below bank interest; for if there are any stands which exceed the age at which specific growth rate falls below the discount rate, there exists an alternate regime with greater present value. These two maxims dominate the equation for allowable cut, unless strict conservation criteria are imposed.

Before leaving this point, we should emphasize that we do not hold that all resource economic thinking is in this narrow rut—we have emphasized extreme examples in order to emphasize the point that the *present value* criterion is inappropriate to public decision making, a position which will be reinforced in the next section.

Two other recent expository papers make good reading, "The Outlook for Timber in the United States" and the "Report of the President's Advisory Panel on Timber and the Environment." Emphasis in these reports is quite different. Both stress the need for intensification of management to increase productivity. The Panel emphasizes the need to increase the conversion rate for old growth by 50 to 100 percent. Outlook stresses the need to increase production on the nation's private lands, many of which are not managed for timber production. However, in both papers, the dominance of wood products is apparent. Projections of the forest into the future are made in terms of cunits and dollars, and little concern is directed to our current question of what the forests of the future will look like. Both are exploitative.

But the section in the Panel report on policy (Chapter 11) strikes an encouraging note. Here it is recognized that a general national policy doesn't exist . . . which is clearly the first step in generating one. And much of the discussion and elaboration of this need is also encouraging. This is a point at which members of this conference can interact if they share our concerns.

There is also a sobering note to Chapter 11, when the Forest Service is chided for its ". . . philosophic convictions as to what constitutes good forestry . . ." This *could* refer to too great an emphasis on timber production to the exclusion of other values, but seems in reference to practices which make good conservation sense but not good economic sense, according to the prevailing economic maxims. Specifically, the insistence on relatively slow conversion of old growth on sustained yield grounds is cited.

### Basic Relationships and Fallacies

In the preceding section, we identified the criterion of *present value* as responsible for many of the operating maxims which we perceive as undesirable, and pointed out the inapplicability of this criterion to societal (national or regional) goals. In this section, we will examine some aspects of this in greater depth in an attempt to understand just why this position is tenable, and to gain a better perspective of the economic and social impacts. We will argue that the fault lies, not in the basic economics, but in the incompleteness of the formulation of the economic model used in the particular cases, and in the inappropriateness of the economic criteria to some problems to which they are applied.

The basic idea of *present value* is that the value received X years in the future from a resource converted into dollars must be discounted over the X years in order to determine the present value of that future income. This is clearly appropriate in some circumstances, as when one is presently buying the rights to that income X years in the future. One fallacy in the usual application is that current market value is ordinarily assumed for the future conversion event. This is inappropriate. Inflation will increase this value at a rate sometimes approaching bank interest, and the relative value of an increasingly scarce resource will also rise. (Historically, lumber products have increased in *adjusted value* at about 1.5 percent per year, and the real shortages have not yet occurred.)

Therefore, when that future value is discounted to present, in determining present value, one should use a term which is something like:

$$\left[ \frac{(1+i)}{(1+p)(1+r)} \right]^{-x} \text{ in lieu of } (1+i)^{-x},$$

where  $i$  is bank interest

$p$  is the inflation rate

and  $r$  is the rate of increase in relative value.

Thus if someone uses a discount rate of 4 percent in the usual analysis, and inflation is proceeding at 5 percent and growth of relative value is at 1.5 percent, then this person is really assuming bank interest of nearly 11 percent, which is not all that conservative.

Of course it is difficult to predict inflation rates, and the rate of growth of relative value, but this is really no different than predicting discount rate. Similarly, the effect of rates varying in time is equivalent for all three, and it is inexcusable to omit the two from the equation for present value.

Is it possible that the economists conducting these analyses have not thought thusly? We may recall Robert Rosen's recent (1974) essay "Do We Really Need Ends to Justify the Means?" There is a strong suspicion that the reason conventional *present value* calculations are generally accepted is that they lead to a strategy that is generally desired. "Convert inventories as soon as possible." And we (the writers of this paper) would possibly never have questioned this analysis if we hadn't been oriented to a less exploitative mode.

And exploitative is just what this strategy is. The application of present value, and particularly in this manner, will lead to shorter and shorter rotations, to the point of depletion of the resource, and to the conversion of forest lands to other uses, until the relative price of forest products rises sufficiently high that the *economic* system is in equilibrium. This can never happen so long as we have inventories which can be cashed in; the push is to cut them as soon as possible, after which lumber supply will be down, prices will go up and equilibrium will be established. But why not accomplish the same thing by declaring that existing old growth cannot be cut? Lumber prices will go up, we will reach an economic equilibrium, and still have our old growth. Without really advocating the latter, we can argue that it is just as feasible as the way we are going. These economic criteria effectively tell us that we cannot live in a land of milk and honey, because then things are going to waste. By these rules, we must increase our demands on these good things until they become scarce so that we have an efficient system.

We can recognize this dilemma as a simple variant of the Malthusian dilemma, which we also have not learned how to solve. But if man is truly rational, then an understood problem is as good as solved; our goal here is to understand the problem. *Present value*, improperly applied, is clearly one of the contributors to the exploitative nature of our current directions. *Present value* just cannot be used in public decision making, at least in the usual way.

Then what about a private owner? Is present value appropriate to an owner, individual or corporate, in making management decisions? The question is indeed sticky for the small owner who cannot structure his holdings in the manner of sustained yield. But for the larger owner, it will be possible to structure a sustained yield operation, manipulate it into an appropriate structure for level yield, and examine the effects of several alternative procedures.

In Table 1, we can observe a number of interesting things. By the criterion of *present value*, we wouldn't let the stand pass age 40, because its specific rate of

**Table 1.** This is based on empirical Douglas-fir yield data from the Siuslaw National Forest, 1965-1975, Timber Management Plan, slightly modified for simplicity. Mean Annual Increment (MAI) assumes a five year regeneration lag; for reference, 4% annual interest yields 48% interest in ten years.

Stand age	Yield (BF/A)	Growth: 10 year percent	Annual increment <sup>1</sup>	MAI <sup>2</sup>	Adjusted MAI <sup>3</sup>
20	8,000	115.0	920	320	363
30	17,200	50.0	860	491	585
40	25,800	31.8 <sup>4</sup>	820	573	717
50	34,000	22.4	760	618	813
60	41,600	17.1	710	640	885
70	48,700	13.6	660	649	943
80	55,300	11.0	610	651 <sup>4</sup>	995
90	61,400	9.1	560	646	1038
100	67,000	7.6	510	638	1077
110	72,100	6.4	460	627	1113
120	76,700	5.3	410	614	1145
130	80,800	4.3	350	599	1174
140	84,300	3.7	310	581 <sup>4</sup>	1197
150	87,400			564	1222

<sup>1</sup>Annual increment is the average over the 10 year period

<sup>2</sup>MAI is the Mean Annual Increment from beginning of rotation (Yield/Age + 5)

<sup>3</sup>Adjusted for a gain in *relative value* of 0.5% per annum

<sup>4</sup>These define management regimes described in Table 2

growth is below 4 percent per annum at that point. However, the greatest annual increment of product is given at 80 years, and at 140 years the annual increment is still above that at 40. Further, it is apparent that growth hasn't stopped when MAI "culminates," as is sometimes claimed.

More interestingly, if we attempt to account for the fact that the adjusted value of lumber products has increased at a rate of 1.5 percent per year over the past six or eight decades, we find that 1.5 percent is too dominant for our data set. At one half of one percent annual increase in relative value, the adjusted MAI culminates between 150 and 200 years, with the projected adjusted MAI for 200 years approximately equal to that for 140 years. Working backward, we find that Adjusted MAI will culminate at 140 years under a growth in relative value of approximately 0.3 percent per annum.

To really see the implications of these analyses, we can generate a table showing several sustained yield regimes on a hypothetical tree farm of 1,000 acres, based on the previous table.

There are other things to consider, such as fire, insect and disease risk, but projected increases in the value of lumber tend to counter these, and this table

**Table 2. Sustained yields and management lands of several regimes, based on the data of Table 1.**

Regime	Annual yield (MBF)	Annual acres harvested and planted
1. Stand age 40, rotation 45	573	22.2
2. Stand age 80, rotation 85	651	11.8
3. Stand age 110, rotation 115	627	8.7
4. Stand age 140, rotation 145	581	6.9

represents the basic dynamics of the situation. On these data, the 145 rotation is clearly better than the 45 rotation, with virtually the same returns and one third the harvest and planting acreage. Selection of the best possible regime depends on value and harvesting and planting costs, but it is apparent that gains in annual income (economic rent) are achieved by lengthening the rotation far beyond the “present value” point and that little is lost by extending the rotation considerably beyond the culmination of MAI (regime 2).

Why, then, the great interest in shorter rotations and rapid reduction of inventory? Surely these simple relationships are recognized by the management economists who specialize in these things. We can suggest one perspective in which the *present value* criterion would again lead to exploitation, shortened rotation, and level yield below the maximum sustainable. We have simply to apply this criterion to a sustained yield regime at maximum return and ask if there is another one which derives from this one by shortening the rotation, and which, although leading to a lowered sustained yield in the future, will have a higher *present value*. The answer is, *yes*, there will always be such a regime if the specific growth rate at rotation age is lower than the applied discount rate, and the process will continue until this equality is reached. Graphically, we will choose the trajectory which starts high and ends low (Figure 1) on the grounds that it is best by the present value criterion, even though sustained economic rent is quite reduced. The principle of exploitation of future resource capacity follows from *present value*.

It is apparent that such an alternative must be attractive to a private individual or corporation; we would only question the choice of an appropriate discount rate. But this cannot form the basis of a national forest policy, because it leads to a lowered productivity in perpetuity. The future society will be deprived of needed resources if this criterion forms the basis for national policy.

Yet it is no accident that the projected curves in the Douglas Fir Supply Study look like those in the previous graph. Application of the allowable cut rule, and all general trends, are based on these dynamics of reduced inventory. And the Study’s projected annual sustained yield under high intensity management is reduced from 2.8 Billion BF to 2.4 Billion BF by reduction of the rotation from 100 years to 70 years. And in the short rotation, annual harvest averages around 5 Billion BF for the next five decades, to fall to 2.4 at the end of the seventh, Figure 2.

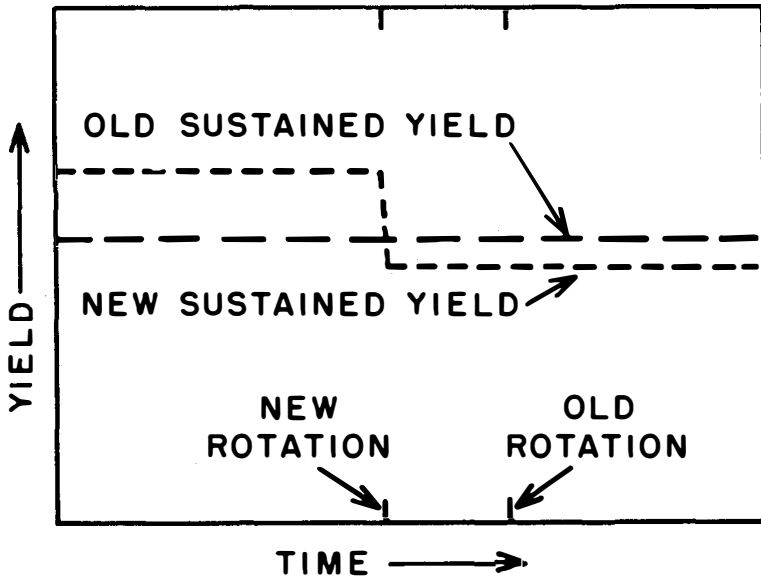


Figure 1. Yield Trajectory When a Sustained Yield at One Rotation Is Converted to a Shorter Rotation Below the Maximum MAI.

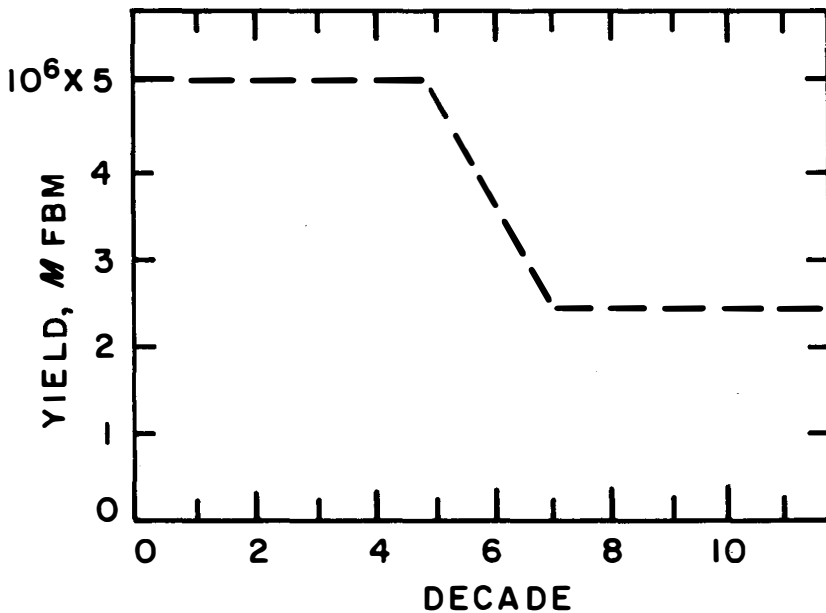


Figure 2. Projected Trajectory of National Forest Douglas-Fir Production Under High Intensity Management, Short (70 Year) Rotation. Adapted From the Douglas-Fir Supply Study.

Let us consider the social consequence of such a trajectory. Five decades from now, according to current direction, nearly all other lands will be reduced to "action" levels. There will be no buffer for the reduction of 2.6 BBF over two decades, and this will create a severe crisis in the lumber industry. We can anticipate raids on identified reserves and wildernesses, and severe inroads into growing stock. Economic and social forces will not tolerate such a drastic shift in supply, and we can anticipate a realized curve more like Figure 3, where the behavior during and after the initial overshoot will depend on the policies which are then adopted. The longer rotation, (as considered by the Douglas Fir Supply Study) with higher sustained yield, is clearly the better choice for the society, and it is apparent to us that a better trajectory in achieving the sustained yield level will approach this level of yield much less precipitously, thus avoiding the stress of rapid reduction in the industry, Figure 4.

It is noted here that the Forest Service is under some pressure to reduce its long rotation and to convert its inventory in a shorter period (Report of the President's Advisory Panel). In our analysis, this pressure must be interpreted as exploitative, and leading to a reduction in future resource capacity.

We find, then, that the system behavior which seems so undesirable in the projections of future Douglas-fir supply is directly predictable from the bases of management economics and should not come as a surprise to anyone familiar with the prevailing maxims and criteria. Further, there are other easily derivable consequences of these criteria which have apparently not been generally recognized.

Economic forces are effective in pushing rotation down to the present value equilibrium, but are quite ineffective in lengthening a rotation when conditions change in a manner which nominally provides a higher equilibrium. The reason for this is simple. In order to lengthen a rotation it is necessary to forego current income, and *present value* will weigh heavily against such an action. As a consequence, under a changing economic regime the resource yields to the conditions which favor the most exploitative regime, even if this condition occurs seldomly. Once raided, never recovered.

Further, present value determination of rotation age is independent of the base level of resource value, but sensitive to the rate of change. Under a fixed relative resource value, the level will determine if it is "economical" to grow a particular species, but only the growth properties of the tree will influence the rotation age. This is caused by the curious switch in "investment" base. When initiating a stand, costs of establishment and maintenance are used as criteria, and if at any point in the future, value provides compensation for these costs, the operation is feasible. But once this point is reached, the stand value becomes the "investment," and rate of growth of this investment is the criterion for ending the cycle. This is determined primarily by rate of specific growth of the stand, relative to the discount rate used.

As a consequence, a species (or environmental condition), in which specific growth rate never rises above the discount rate, can never be considered for reforestation, no matter how high prices rise! If we inherited such a species in ample supply and distributed properly for sustained yield on, say, a 100 year rotation, then the present value criterion would drive the rotation age to *zero*, even if prices remained high. This is the extinction phenomenon reported by Clark (1973) in another resource context.



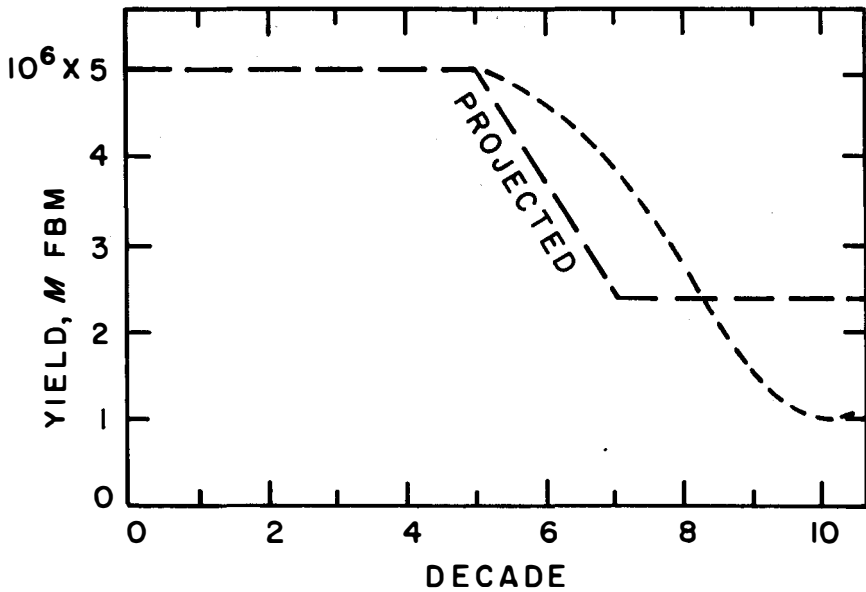


Figure 3. Anticipated Consequence of the Attempt to Follow the Trajectory Projected in Figure 2.

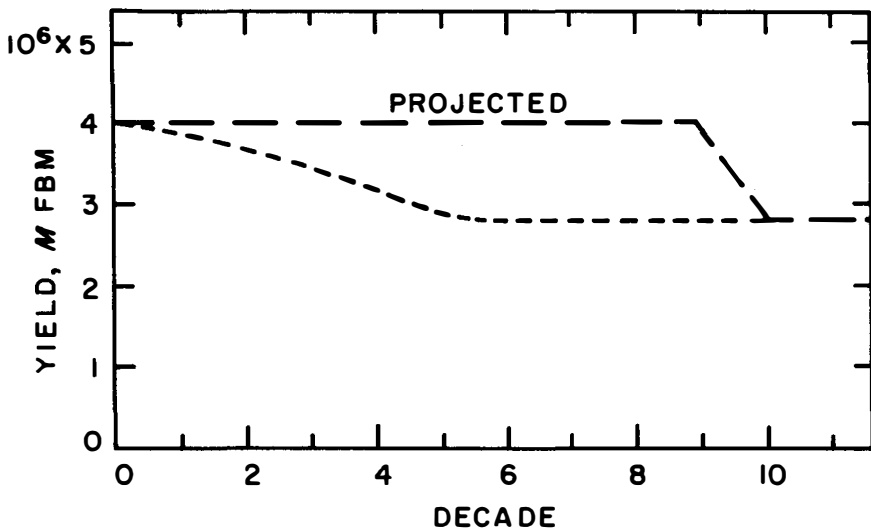


Figure 4. A More Desirable Trajectory to the Perpetuated Sustained Yield for the 100 Year Rotation Considered by the Douglas-Fir Supply Study.

This observation is doubly disturbing, because one of the basic articles of faith in depending on economic principles for decision making is the achievement of equilibrium by supply and demand. As prices rise under forest product shortages, it will become feasible to reforest in many cases where it is not now feasible. But some species and some environments are ruled out by the simple fact that specific growth rate *never* gets high enough, and is not influenced by price.

These thoughts lead to the observation that, even for those species and environments which are favorable, when needs for forest products become acute and prices high, we will still follow a sustained level considerably below that which can be maintained—unless we acquire the wisdom to choose a discount rate which is consistent with society's resource needs. This is equivalent to rejection of the present value criterion in favor of a resource-need conservation criterion.

We have got to recognize that the criteria applicable to the individual are not appropriate to the society. We must develop appropriate criteria for society, and learn to translate social needs into policies within which private individuals and corporations can operate according to their relevant criteria.

### **Toward a General Strategy of Policy Formulation**

At this point in our paper we shift to a more positive mode. We will build on the preceding critique of prevailing practice and method by outlining the essential features of an acceptable strategy for policy formulation. It is important that we emphasize the strategy, or approach, to policy formulation rather than the policy itself, because policies are very much the tool of the occasion. It is the essential strategy which can remain unchanged under changing ecological and social circumstances.

First, we consider that an acceptable strategy must lead to an equilibrium state. If we cannot tolerate a strongly pulsing output of forest products, then there must be achieved an equilibrium or near equilibrium forest in which the annual output of forest products is nearly constant. We will designate this the Stable Product Distribution, SPD.

Next, we observe that the nature of this forest is of particular interest to us. In equilibrium, there will be defined a steady state characterization, analogous to the stable age distribution of population dynamics, which we will call the Stable Structure Distribution, SSD. This does not have to be absolutely fixed, but we can best think about it if we conceptualize the SSD as represented by exactly so many acres of each of a prescribed variety of forest type and age, in prescribed region of management, year after year. Each year, some stands are "converted," but growth and aging replaces these in the distribution.

This concept is similar to the conventional concept of sustained yield forest, except that it is more general—*much* more general. Within a management unit, the spectrum will contain all variation appropriate to the unit. Some stands may be on 100 year rotation, some on 150 year rotation, some on 200 year rotation, some in perpetual unharvested state. Similarly, the desired diversity of species combination and stocking levels will be provided, within the ecological potentials of the sites contained in the unit.

The management unit is thus a sociological-ecological entity, with a sustained yield of forest products (SPD) and a sustained spectrum of ecological diversity (SSD) which have been chosen by the society in forming the unit. In this manner we identify the first step in the strategy of policy development.

*I. Choose a Stable Structure Distribution (SSD) and a Stable Product Distribution (SPD), jointly called an SD pair.*

That is, the first step is to decide what we want the forests of the future to look like, and what we want them to provide to our society in the way of resources. Although we have phrased this as a *fixed* sustained yield, steady state concept, a great deal of flexibility can be accommodated without damaging the integrity of the concept. Specifically, we will consider a *family* of SD pairs, such that any member of the family is reachable from any other member. Choice of any member then allows reachability of any other member.

Given a chosen SD pair, the next problem is conversion from our present state into the chosen state. We express this step,

*II. Choose a Trajectory Between our Present Condition and the Chosen Stable Distribution (SD) Pair.*

Again, this trajectory does not have to be exactly fixed—it can be represented by a family of trajectories, such that the target steady state condition is reachable from any member. For simplicity we conceptualize this as a single trajectory, but it is important to recognize that perturbations will not need to be corrected in terms of the trajectory, but rather in terms of the desired goals, the chosen SD pair or its near neighborhood.

The third step is

*III. Formulate Plans and Policies for Implementation of the Trajectory.*

Given that a particular trajectory has been chosen, there are many possible explicit plans which will yield that trajectory. The choice of one such plan, which also can be quite flexible within constraints placed by the chosen trajectory, requires a lower level of decision making than Steps I and II. Whereas I and II were concerned with what we want our world to be like and to provide for us, and how much trauma and sacrifice we are willing to accept in achieving that condition, Step III gets back to the nitty-gritty of deciding which spot of ground is going to fit which part of the pattern at which point in time.

Again, we must comment that a great deal of flexibility is possible, and vitally necessary. Given perturbation in external factors, it is mandatory that plans and policies yield to the chosen goals. Further, the resultant *policies* are somewhat higher in level than *plans*. Plans are policy implementation over the short haul, hence vulnerable to short term perturbation in circumstances. It is absolutely necessary that this hierarchy of decisions be explicitly formulated and followed.

The major problems facing us at present are implementation of Steps I and II, and a very important consideration which lies in yet another dimension. We must come to grips with the question of public and private forest lands, and the role that each must play in providing needs for the society.

It is possible to view the private sector as lying essentially outside the sector subject to resource goals. In this view, it will be necessary to concentrate all regulation of forest conditions and production on public lands. This will not only place a severe strain on the capacities of the public lands, but will also constrain considerably the allowable spectrum of SD pairs. There is currently some sentiment for this view of the role of public forests, as witness the discussions of the allowable cut effect.

We believe that we cannot maintain a viable forest resource for the future unless the private sector is included, and policies generated which ensure the management of private forests in a manner compatible with national resource needs. It is apparent that the policy expressions relating the two sectors to national goals must be very different. Whereas public lands can be managed by publicly stated management policies, based directly on resource needs, private lands must be managed by the owners, individual or corporate, in the economic mode. National resource goals must be translated into operating regulations, or market-place factors, in order to effectively guide this segment. These are problems which we do not wish to engage in this paper, but their recognition is essential.

Implementation of Step II involves the conceptual basis for implementation of Step III and some important additional elements. Particularly important is the appraisal of the effect on the economy and on social role structure dynamics of a shift in the level of resource products. The phase of transition from current resources to the sustained yield levels will require a major shift. The key consideration is the *rate* of transition, or the slope of the trajectory. As expressed earlier, it is absolutely appalling to us that current projections even consider an abrupt transition at the end of the proposed old growth conversion period. We consider economic and sociologic considerations essential to the planning of admissible trajectories and to the successful execution of the proposed strategy.

Implementation of Step I requires even more consideration. It is one thing to identify the need and yet another to devise means of identifying the specific SD pairs most desirable for the sustained yield forest. Yet it is certain that a satisfactory resolution of this can only follow development of a good strategy for that resolution. It must be possible to classify SD pairs as good or bad—else there is no way to guide the system. Without attempting to derive such a strategy, we can address some of its components and necessary inputs.

1. An inventory of forest lands, their current status and ecological and productive *capacities* is essential.

2. Advances are needed in the understanding of stand dynamics and response to management. Recent information regarding stocking levels and stand growth response have made obsolete the existing concepts of optimum rotation. All indications are that rotations should be longer, and perhaps much longer, than is held by current opinion. This is compounded by the paradox caused by use of *present value* in definition of rotation age, and further by the simple fact that lengthening rotations considerably past optimum often has slight influence on resource income. A great deal of rethinking is needed here, and reeducation.

3. Ultimately, there must be defined explicit trade off relations between values—as between forest product values and other values of the forest.

Necessarily all of these values are with respect to society, and the non-monetary values are strongly culture dependent. Two points for development are apparent.

Since cultural values can be expected to change, the only feasible conservative policy is one that conserves *options*. As we have argued elsewhere (Bella and Overton 1972) a *strategy of preserved diversity* appears to be the only device which will yield a high chance of adaptability to unforeseen eventuality. We would put a high premium on the ability to reach any SD pair from any other in the set of permissible SD pairs. This amounts to an explication of the *principle of avoiding irreversibilities* (Bella and Overton). It may be necessary to add components to some of the identified SSD's in order to include all desirable SD pairs in the permissible set.

Most of the tradeoffs which readily come to mind are those in forest values. However, forest raw materials must also be viewed in the trade off context with other resource raw materials. The decision to reduce forest products must be accompanied by the decision to either increase some other resource product or to reduce the resource base of society. Questions of resource substitutability, societal dynamics and many others are apparent here, and must be accounted for in the process.

4. The process of identifying a permissible set of SD pairs will necessarily be complex, and we anticipate the need for a simplifying (but not necessarily simple) device for evaluating the acceptability of a proposed pair. We suggest that the only way we can lay claim to good properties for the legacy of our current policies is by putting ourselves in the place of future generations and asking if we would be happy about our legacy. The idea is developed in the next section.

### **An Approach to Appraisal of a Projected Steady State**

It has long been recognized that one reason that conservation matters fare badly in the current paradigm of cost/benefit analysis is the phenomenon of discounting the future. In an earlier section of this paper, we addressed the economic model (*present value*) which is the basis of this phenomenon, and argued against its use on simple economic grounds. It was shown that application of the *present value* criterion, as usually practiced, leads to a depleted resource base.

In extension of this result, we suspect strongly that if all economic and resource dynamics are accounted for, it will turn out that level *resource rent*, in perpetuity, will be the optimum, even in a purely economic analysis, and further that the value of a substantial hedge, in the form of reserves, will more than offset the reduction in *resource rent* afforded by removal of those reserves from the productive category.

But the same conclusion (for level rent) is obtained from a non-economic perspective. If we use a criterion such as *present value* in choosing a trajectory, we will always cash in as much reserve as possible, as soon as possible, and obtain a trajectory something like Figure 2, and where the sustained yield level is chosen at the point at which acres forested is determined by price and rotation by specific growth rate and discount rate. But if we were to ask a citizen of the year 2074 which trajectory he wished we had taken, he would opt

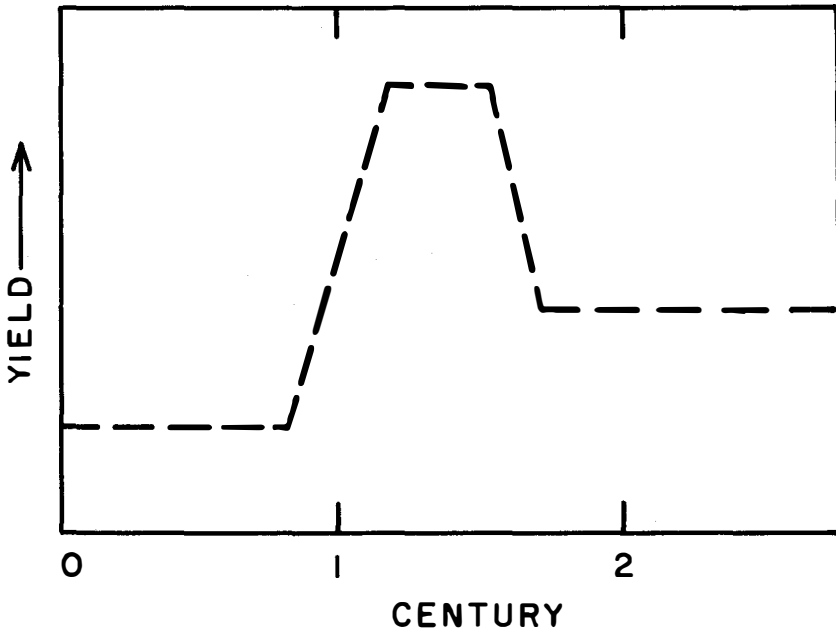


Figure 5. The Yield Trajectory Which Would Appear Optimal by the Present Value Criterion Applied in 2074.

(if he uses the present value criterion) for a situation something like Figure 5. And he would not only want a favorable proportion of stands in the category which he could exploit, but he would be happy to get some stands on non-economical sites as well. If we take the most desirable such curve from the point of view of each generation and attempt to provide it as closely as possible for each generation . . . we will always come up with *level yield*.

Our appreciation of this can be expressed by the recognition that if we operate on *present value*, future generations will have to live with a depleted resource. This recognition can also serve as the basis for an alternate criterion . . . that of conserved resource benefits. We argue that public criteria must require that we provide the *capacity* for each succeeding generation to receive the same resource benefits that we receive. This concept is central to the *Old Conservation*, but it seems to have been squeezed out by the post-World War II emergence of resource economics.

On these thoughts, we can devise a rule for choosing among alternative forest policies, and extend it to a device for formulating alternative policies.

*Test each proposed policy by tracking its consequences into the future and asking each succeeding generation if it appears good in retrospect. Label as good only those trajectories which are uniformly good in perpetuity.*

Explicit implementation of this, in general, requires a model for projection of policy impact and a procedure for asking the question at points in time. Although such an explicit general capacity would be of great interest, it would be a very ambitious undertaking to implement this capacity. Thus it is also of

great interest that the essence of the concept can be subsumed into a much less ambitious program, which will yield good operating criteria.

We have proposed that policy making should proceed by the device of establishing goals, in the form of SD pairs, and a trajectory for achieving such goals. Under this approach, the prediction problem is eliminated from *goal appraisal*. A rocket will travel a predetermined path to a predetermined destination if there is a control system which properly chooses a trajectory for the destination and which corrects for deviation from the chosen trajectory. It is a non-trivial problem to design such a control system, which is the problem of Steps II and III in our strategy, but Step I does not require any predictive capacity for its completion.

What Step I does require is a means of appraisal of a specified SD pair, and we argue that this must be oriented to the needs and value systems of future generations. Although we must recognize that we cannot know precisely what those needs and values will be, and so must adopt a general strategy of conservation of options, it will be very helpful to us if we attempt to discover the dimensions of the possible needs and values by playing a game.

In this game, we will have two modes: We may specify a particular SD pair, and evaluate the pair from the point of view of how well our society would be served by it, or we may attempt to devise the SD pair which yields the best resource base for society. In implementing this, every conceivable point of view and alternative value will be sought out. The goal of the game is to recognize possibilities; gaining perspective is more important than obtaining a consensus. Indeed, the game is invented as a *method* of identifying questions which disclose overlooked aspects of resource/society interaction.

We do not want a consensus on the nature of the best future world, but rather identification of the variety which must be maintained in order to provide future generations with meaningful choices and options in maintaining a world which *they* believe to be good. In terms of our Strategy Step I, this translates into specification of a set of SD pairs, such that each member of the set is reachable from any other member, and such that the greatest possible collection of possibilities is accommodated. Then, we choose one element of this set, such that this element appears to *us* to have very high value *and* a high coefficient of reachability to other high valued elements, and let this element be the explicit goal of our current policy development.

The property of *reachability* is especially important in these considerations. To illustrate, if we opt for a Stable Distribution in which old growth has been eliminated, then it is *possible* to regenerate stands of old trees—but this would require a substantial sacrifice by the 10 or 15 generations which must commit to this decision. In contrast, this decision can be made now with little sacrifice. After the period of old growth “conversion” (10 to 40 years—depending on whom you believe) we will enter (according to plan) a level yield of Douglas-fir which is between 50 percent and 60 percent of the current level. We can enter that level sooner and preserve old growth options, by asking a much smaller sacrifice from only the current one or two generations. (Note that this option will ask a much smaller sacrifice from the generation immediately following conversion than is asked by the current plan!)

In our opinion, the proper use of mature stands, including old growth, is not in maintaining a high level yield until exploitation is complete, but rather, after

a decision has been made with regard to the desired SD pair, including how much old growth will be maintained, in achieving a smooth economic and social transition to this Stable Distribution. The longer we wait before accepting this position, the more difficult it will be *both* to save some old growth in reserve *and* to achieve a smooth transition. We are rapidly spending options which *we* will need in 20 years—and which future generations are going to need even more than we do.

Reachability, then, involves the *possibility* and *feasibility* of devising a policy which defines a trajectory from one stable distribution to another. Some SD's are more easily reachable than others, from a particular one, and *irreversibilities* are represented by those SD's which are for all practical purposes not reachable from the SD resulting from the policy we adopt. Similarly, the breadth and ease of transition in the set of SD's reachable from the one toward which we are heading determine the true diversity of option in our present policy. And lastly, the diversity of option is strongly related to the diversity in the SD. Our current directions are toward a greatly lowered diversity in both the SSD and the SPD, a trend which is clearly toward lowered diversity of option and greater irreversibility, hence it is undesirable according to our perspective.

### Summary

The future state of our forests is shaped by our current practices and determined by the policies on which our current practices are based. We find that current policy and data base are not explicit in any sense which allows identification or recognition of the states toward which we are heading and, further, that the economic bases of the prevailing practices are exploitative in nature, and lead to exploitative practices. If we continue on the current course, following these bases, the forests of the future will be depleted, and maintained far below the potential contribution to mankind.

We suggest an urgent need for reappraisal of values and goals, for recognition of the fundamental distinction between the objectives of private business and of society, and of the necessity of developing policy couplings which translate societal needs into practices and public policy which provide for the perpetuation of forest resources in the broad sense.

We argue that the only tenable basis for policy judgement is the provision of a desirable forest state for this and all future generations, and that ecological and cultural uncertainties dictate that the only tenable strategy of such provision is the conservation of all possible options. We make these options explicit in the sense of steady state forest conditions and yields of forest products and values, which we call Stable Distribution pairs.

A strategy of policy formulation is outlined, which involves identification of a *SD pair* which is in the desirable set and which is valued "good" at present, identification of a trajectory of approach to this stable distribution, and translation of this chosen trajectory into operating policies and practices.

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## Discussion

DISCUSSION LEADER NEWBY: When we talk about balance, it is only natural that each of us views balance from a different position on the scale. Here we have one viewpoint on the scale. We will have others later.

It is good that we have a provocative presentation such as this at a time when our personal energy resources are dwindling and it is questionable whether there are renewable resources.

We will now open the session to questions to Dr. Overton.

PHIL THORNTON [Washington, D.C.]: Dr. Overton has made a number of interesting observations and, just to get the ball rolling, he made one comment that I had difficulty relating to. If I understood right, he suggested that, in figuring allowable cut, we take advantage of an imaginary growth or growth not yet assured. I had a difficulty with that because on numerous occasions I have heard several individuals talk to that point. For example, with regard to pressure for increasing harvest you cannot do that until the trees are in the ground or the work is under way.

# Considerations for Wildlife In the Allocation of Montana's Forested Habitats<sup>1</sup>

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During the past year the authors conducted an analysis of existing and needed information in the allocation and management of Montana's forested habitats. The major objective of the study was to identify the problems related to evaluation, manipulation, management, and allocation of these forested habitats, with emphasis on wildlife. The approach was directed primarily toward a field review of these problems with resource managers, wildlife biologists, and resource administrators with the several public land management agencies in the state.

Interviews, discussions, and on-the-site observations involved personnel with the U.S. Forest Service, Forest Sciences Laboratory in Missoula, Bureau of Land Management, Montana Fish and Game Department, Montana Fish and Game Commission, professors involved in teaching and research in Wildlife Biology at the University of Montana and Montana State University, and several ranchers. Field observations of problems involved visits to nine national forests, five game ranges managed by the Montana Fish and Game Department, the Bob Marshall Wilderness, the Sun River Game Preserve, the Skalkaho Game Preserve, and the Missouri River Breaks area. The authors had the opportunity to observe the various forest habitats inhabited by the Shiras moose, Rocky Mountain goat, white-tailed deer, mule deer, pronghorn, bighorn sheep, elk, grizzly bear, black bear, and many species of small mammals and birds common to the forests of Montana.

The various interviews, discussions, field observations, review of environmental impact statements and multiple use plans of federal agencies, and an extensive literature review allowed the formation of a synoptic analysis of the problem involving wildlife habitats in the forests of Montana.

The federal and state forest resources of Montana provide various commodities which man has defined as game mammals and birds, wood products, livestock forage, water for commercial uses, minerals, and recreation in all its many facets. Multiple use of public forests is a generally accepted concept. However, in practice it is immediately apparent that a specified area of forested land cannot provide all these commodities in a multiple-use framework. Thus, there arises the need for an allocation of the forest resource to the various commodities. This paper is directed to this topic, with emphasis on the wildlife resource.

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<sup>1</sup>This habitat problem analysis was supported by the Montana Forest and Conservation Experiment Station and the McIntire-Stennis Forest Research Act.

The relegation of wildlife and their habitats to a secondary or tertiary position on state and federal forest lands in Montana was readily apparent during the course of the problem analysis. Demands by various interests for the extraction of economically valuable wood, forage, water, and minerals receive primary consideration. Allocation of forest habitats primarily for wildlife use is generally by default, rather than by purpose. That is, wildlife generally receive whatever is left after all other interests have been satisfied. Pengelly (1972) stated: "Judging by the ratio of wildlife managers to foresters in the public employ, wildlife interests have not been dominant, nor even important partners, in multiple-use management." We found this to be true during the course of our problem analysis. Why does this occur?

Economically oriented interests seeking allocations for logging, livestock grazing, mining, irrigation, and energy production have an "action" program to present. They have definite goals, proven techniques for achieving them, cost-return analyses, and local support by the Chamber of Commerce and labor force. Perhaps the most important consideration of the land management agencies is the impossible-to-ignore fact that these uses of forests provide an easy method of showing accomplishment. For example, millions of board feet of logs harvested, acres of grass seeded, acre feet of water impounded, and acres of sagebrush sprayed are readily quantified and included in annual accomplishment reports to the Congress and to state legislatures.

Wildlife are not viewed as an economic commodity by land management agencies. This may help explain why those few individuals responsible for the wildlife resource on Montana's public lands have no "action" program, and operate in a defensive capacity. The biologist usually recommends leaving the forest undisturbed, often because he has little information on how manipulation of a forested habitat will influence it as habitat for a particular wildlife species, especially a nongame species. Thus, he is unable to report accomplishments in a quantitative sense, so necessary for obtaining appropriations.

One of the major problems encountered in our problem analysis is the widespread confusion as to what constitutes the habitat of a given species. There is little help in the literature. For example, Wing (1951) generalized by stating: "Land has attraction or lack of attraction to a species according to how well it supplies the life essentials. As has been said before, these essentials are food, cover, and such other requirements as the species may have." No attempt was made by Wing to identify these other requirements. Dasmann (1971) stated: "We might picture the elements necessary for deer survival as a triangle, the points of which are food, water, and cover." Will deer survive and prosper in a wild state if only these elements are provided? Ripley and Halls (1966) expressed the need "to describe interrelations between plants, animals, and the environment (habitat relations)," then proceeded to discuss only those factors affecting deer food production in the section titled "Habitat Relations." Are research scientists relying too heavily on principles developed for livestock management when attempting to manage the habitats of free ranging animals? Do wild animals have set behavioral requirements that must be satisfied by the habitat?

Most authors of books related to wildlife management, animal ecology, and range management use the term "habitat" liberally, but loosely. Very few

attempt a definition, apparently assuming that everyone knows what "habitat" is, so why define it? Those few authors that present a definition of habitat have mostly resorted to an all-encompassing definition which has little or no practical use to the biologist in the field. Hanson (1962) defined habitat as "the sum total of environmental conditions of a specific place occupied by an organism, a population, or a community." Kortright (1942) stated that bird habitat is "natural abode; the kind of environment in which the bird occurs." The Committee of North American Wildlife Policy (1973) wrote that "habitat is local environment." If these are the best descriptions or definitions of habitat that research scientists can supply to field biologists, how then is the biologist to know what factors or conditions of "the sum total of environmental conditions of a specific place," "natural abode," or "local environment" should be preserved or manipulated for habitat improvement, maintenance, or the development of new habitat?

Another problem often encountered in the field is that the wildlife biologist seldom has meaningful objectives, stated or assumed, for specific wildlife habitats on his forest or district. Statements such as "our objective is to protect wildlife habitat" were often encountered in the field. Such objectives are extreme generalizations which mean nothing in terms of objectives for a specific site or species. This observation was often denied in the field until the biologists were asked for specific objectives for a particular habitat or site, and which species were to be favored. It then became apparent that no such objectives exist on most of the forested lands of Montana.

The lack of objectives precludes the identification of problems. For example, there are no objectives, stated or otherwise, for preserving, managing, ignoring, or eradicating the grizzly bear on Montana's public lands. How, then, can any problems be identified by the biologist? Again, there are no objectives by land management agencies to preserve, maintain, manipulate, or destroy Rocky Mountain goat habitat. Therefore, clearcutting near goat habitat, fire suppression, access road construction, and livestock grazing cannot be considered problems.

This paper to this point has dealt with problems encountered in achieving equal consideration for wildlife on public lands. Agencies controlling these lands control the land resource but do not manage or manipulate animal populations on most of them. Thus, considerations for wildlife on the public lands of Montana are in terms of habitat. How can meaningful considerations for wildlife habitat be attained?

Land managers and wildlife biologists must first establish specific objectives for each site, or habitat, on the land under their control.. This can be done only on a local basis, not agency-wide, state-wide, forest-wide, or even district-wide. These decisions must include the animal species to be favored, controlled, or ignored for each site. They must come to realize that there is no such thing as preserving, managing, or improving wildlife habitat, but rather elk habitat, beaver habitat, kangaroo rat habitat, etc. The terms "wildlife" and "wildlife habitat" must be separated into their component parts to have meaning. It then becomes apparent that some species may be benefited, others harmed, and the majority influenced in a manner which we are presently unable to predict.

Once the objectives are clearly defined, then problems to be encountered in meeting these objectives can be determined. These may include voids in

information, lack of technology, lack of funds and personnel, and perhaps a need for changes in policy, stated or unstated.

Once the objectives are established, problems identified, and solutions found for the problems, then a plan of action must be developed for achieving them. Now, and only now, can the wildlife biologist have an "action" program. However, there appears to be a tendency to manage wildlife habitats by planning. The "plan of action" must be the beginning of the "action" program, rather than the end product.

Administrators and wildlife biologists must also develop methods of quantifying accomplishments for wildlife habitats, especially where no manipulation of the habitats occurs. The plan, itself, must not be allowed to be the only, or even the major, reportable item of accomplishment.

Perhaps a major share of the blame for the lack of adequate habitat management must rest with the universities. Few Wildlife Biology, Zoology, and Range Management departments offer even one course devoted specifically to the management, manipulation, and development of wildlife habitats. Those few that provide such courses often dwell on large ungulates or game species and their needs for food, water, and cover.

In recognition of the need for conducting research and educating students in the principles of management of wildlife habitats, the School of Forestry of the University of Montana has developed a major program in habitat management. Our habitat problem analysis was the initial step in identifying the type of research and teaching program that is needed. A curriculum in habitat management has been developed, and problem-oriented research projects are in progress. We hope, and believe, that our "plan of action" will be the beginning, rather than the end product.

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### **Discussion**

DISCUSSION LEADER NEWBY: The importance of wildlife habitat on the public lands of the western states can hardly be overstressed as habitat and access to habitat on private lands become more and more reduced. I would think that wildlife managers in the audience would be challenged by the remarks if they have no action plan, if they are confused about what wildlife habitat is. Therefore, I trust there will be some response to these points that are made in Dr. Willard's paper.

MR. HAL SALWASSER [California]: Many state concerns about problems of wildlife on forest lands are also logical in California. However, I did not get any indication from you as to specific remedies. In your studies, therefore, have you made any effort to provide land managers with biological information supported by field investigation to improve capabilities of including wildlife in planning efforts?

DR. WILLARD: The question that you have raised, if I understand it correctly, is where do we go from here?

There are several things that we are doing. If we only state the problem and do not work beyond that, we are accomplishing nothing.

We are planning specifically to train students in habitat management. We are considering many research projects that will answer these questions on the forest lands of Montana. We are in the process of working out some of these research projects.

We are starting a major research program to try to identify all factors in the habitat of mammals and birds in Montana.

We will probably begin with the forest grouse and try to model their habitat to determine everything involved, and determine, on this basis, how to predict what will happen if any factor is changed or manipulated.

We have been talking about the possibility of an extension program or continuing education program. Our method is to try to get people together for a week or two, to review what information is available, to perhaps get them on the ground in various teams, to try to come up with a method of evaluating and manipulating a particular habitat.

We have just begun this and, therefore, we do not have all the answers. However, we have some.

Our problem and first step has to do with analysis. We have essentially completed this and hope to start trying to remedy these problems from here on out.

DISCUSSION LEADER NEWBY: Are there further questions?

MR. JOHN NOOMA [Cody, Wyoming]: First of all, I would like to state that I am in total agreement with some of the comments that you made, particularly relating to academia's failure to provide background in habitat management for wildlife biologists. Your paper was certainly food for thought and I would welcome the opportunity to discuss many of the points you raised.

I would like to caution you and, at the same time, challenge your statement where you stereotype the biologist. I do not believe that this is the case, particularly with regard to land management biologists.

DR. WILLARD: If I understand your comments, they are well taken. However, I would like to say that we were specifically relating our comments to Montana. We have interviewed several biologists who, in general, stated that until they have more information about all they know how to do is to tell the loggers to stay out of the forests. In Montana, this is true, and in other states I hope it is not true.

MR. NOOMA: I understood that the paper was directed at Montana and that may be the case. However, I want to reiterate about stereotyping the latent cost of public land.

DR. WILLARD: That was only in relation to Montana.

MR. RICHARD HUBBARD [California]: I am concerned about the lack of useable definition of habitat. The general definition of habitat is a workable definition. It is up to the federal biologists to define the specific habitat situation and see that the situation is working.

I was also concerned by his concern for lack of a clear statement of objectives and the amount of knowledge and confusion of knowledge in relation to planning. I think these concerns are mutually exclusive.

DR. WILLARD: I don't know how to respond to that except to say that with those particular people that we interviewed, this is what we found. We have also reviewed many environmental impact statements and land-use plans within the last two years. It is very difficult to find any statements related to wildlife habitat that are not extreme generalizations.

I would challenge those of you who have not reviewed these to do so.

The general statement is, however, that we are doing this or that, and it will not harm wildlife. Of course, if wildlife is separated into its various components, we find that wildlife is not a species but is many species. We know that if a habitat is manipulated,

certain species will be harmed, others may be helped, and most of them will be affected in some way that we cannot now predict.

Again, there is no such thing as wildlife habitat. What we are really talking about is elk habitat, moose habitat, kangaroo habitat, et cetera, and when you look at a plan or an environmental impact statement, the word "wildlife habitat" is used which to me, means that there has been very little thought put into this as to species.

MR. DICK MILLFORE [Bureau of Sports Fisheries, Denver]: Are you not taking some chances in generalizing on developing a patchwork specifically for habitat management without really putting all that together with species and other factors involved? I think there is a tendency to generalize a lot of these fields, and then we start making exceptions to the rules. Do you need to take all of these factors into consideration jointly?

I would hate to see emphasis placed specifically on habitat management without relating to populations and other factors involved.

DR. WILLARD: Of course, this is true.

We have developed a curriculum that will include many wildlife biology courses, including population dynamics, and population ecology. As is the case in any curriculum, whether you call it "rangeland" or "wildlife management", we do have a lot of supporting courses that must be brought together into a round version.

So, yes, we do plan to draw from all sources to try to round this out. Your comment is well taken.

# A Balanced Program for the National Forest System

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The problem of achieving balance in public lands programs has been with us for a long time. Ever since man began to manage and use the lands and resources set aside or left over after settlement there have been questions of balance among competing needs or demands. Perhaps at no time in the past, however, has there been the kind of sustained—almost frenzied—concern over balancing environmental and economic goals that we are experiencing in 1974.

The Forest Service has had the responsibility of managing the National Forest System since 1905. During that period a long parade of foresters, biologists, engineers and other professionals have grappled with various aspects of the challenge to achieve balanced programs of management for these particular public lands. The size and character of these resources—and their importance to the American people—have forced serious attention to the broad questions of how they are to be protected, managed and used.

These lands are equivalent in size to France and the United Kingdom combined. They have a complexity of fauna, flora, topography, climate, and soils spanning the range from Alaska to Puerto Rico. There has been a long history of public use. It is no wonder that an almost endless series of questions of program balance that relate to specific situations has been a dominant theme throughout the stewardship of these lands by the Forest Service.

Some of the issues are relatively new—for example whether or not there should be cloud seeding where wilderness areas are involved; or if these lands should be used as a bombing range for training air crews in use of the latest military hardware; or whether they should be used for massive radio communications systems. Other issues of balance date back to the earliest uses and development of these lands. For example, the Gila Wilderness was established by the Forest Service 50 years ago—and we can be sure there were healthy debates within and outside the Forest Service prior to that action. The point is that there has evolved over the years a pattern of action and reaction; of initiative and of “holding the line,” of study and debate and conclusion; of emotion and argument and controversy. Just about all of this comes under the general heading of trying to achieve a balanced program for the National Forest System.

I'd like to take this opportunity to trace briefly where we have been, where we are now, and where we seem to be headed as an agency trying to cope with a dynamic situation where changes come fast and often without much warning.

One of the first and strongest and most meaningful approaches toward balance is the concept of multiple-purpose use of forests and related resources. This planned, purposeful coordination of uses has long been the way our agency has sought to get optimum results from our administration of these lands and resources. Another has been the concept of sustained yields of goods



and services from these lands. That is to say that the needs of today will not be met at the expense of future generations. These two approaches were formalized in the Multiple Use-Sustained Yield Act of 1960. Hand in hand with these came the idea that some specific areas of land were clearly best suited for a primary purpose and could be managed for that within the context of multiple use. Wilderness areas, municipal watersheds, plantations of genetically improved timber species, mineralized areas, wildlife production areas, some livestock grazing lands, and certain recreation sites—ski slopes, for example—illustrate how the Forest Service has tried to achieve program balance within the co-equal status of water, timber, range, wildlife and outdoor recreation that has been established by law.

I would like to emphasize that the Forest Service continues to believe that management of these lands for multiple purposes is the key to meeting the almost overwhelming demands that lie ahead. Within that we can and do seek to grow and harvest timber primarily from the most productive sites; maintain fish and wildlife habitat when and where needed; assure adequate flows of good quality water; increase livestock production without damage to the range land; provide a full range of outdoor recreation—including wilderness experience; and so forth. We think that the total output of a wide range of goods and services is much greater through the purposeful coordination of uses of these public lands than can be achieved through any other concept or system of management. To the extent that we are successful in this regard, a balanced program for the National Forest System is assured—at least in the sense of on-the-ground management decisions.

Let's take a brief look at the present situation. In recognition of changing times and new demands upon these lands, the Forest Service has done and is doing a number of things to address this "program balance" question.

In 1970, we took a long hard look at our objectives to be sure that they were geared to the new decade and that they were responsive to public needs. We put together what we call the Framework for the Future—a set of broad policy guidelines within which we can establish program direction.

The National Environmental Policy Act which also became effective in 1970 has required even more attention to the environmental impacts of resource management options. This NEPA mechanism is a significant influence in the continuing effort to identify optimum program balance. It is effective both in the overall sense and in the case of specific action plans for particular units of land or individual project proposals. The Forest Service is making widespread use of environmental impact statements as a means of strengthening the decision-making process. In CY 1973 we filed 174 statements with CEQ mostly dealing with National Forest management. Our unit plans—each of which encompasses a major portion of a National Forest—are presented as draft environmental statements, with the real focus on program balance.

Closely related to the NEPA process, but even more widespread is our agencies' increasing effort to obtain meaningful public involvement in the decision-making process. This in no way could be called an exact science. We are still searching for better methods. We have used listening sessions, public hearings, formal presentations, show-me trips, and individual discussions with interested groups or people. Here too, the ultimate objective is to get a full

measure of program balance into our actions—that is to say, as much input as is available to reflect all interests and options that are pertinent to the question at hand.

Another approach that we are using is to have the combined talents of inter-disciplinary teams focused on the subject at hand. No longer, for example, is a timber sale offering a matter for timber management experts alone. Nor is the design and location of a proposed road or trail left to the engineering staff. The wildlife biologist, the landscape architect, the range management expert, the hydrologist—all of these and more have a shared responsibility in making land use or resource management decisions. To the extent that we can learn to effectively apply these diverse talents, and couple them with a type of public involvement that is an accurate portrayal of the public interest, then we are sure to improve overall program balance as we aggregate the effects of many localized management decisions.

This whole concept of what we call “unified planning and decision-making” is a fascinating new dimension in how to approach the complex resource management issues of the day—both localized and regional or national in scope. This conceptual framework for Forest Service planning and decision making has been recently published in detail. Copies can be obtained from Stanford University. The report is entitled *Unified Planning and Decision making; A Conceptual Framework for Forest Service Management*; Stanford Report EEP-49, authored by Ross Carder and Clarkson Oglesby.

So far, I have been talking mostly about achieving program balance in terms of specific actions. Daily decisions have to be made about whether or not to do something—or some set of actions—on a specific piece of land in the National Forest System. Usually it is fairly easy to see the particular issues, or the “trade-offs” that are inherent in each management option. It is relatively easy to see if there is in fact a “balance” possible among the various possible uses. It is comparatively easy to get public involvement that represents local interests and needs. It is generally possible to prescribe the coordination of uses that will be most responsive to both the technical and non-technical inputs gained in the planning and decision making process.

Let us now shift to the broader and more difficult challenge of seeking program balance on a comprehensive regional or national basis. Here too, the Forest Service is attempting to grapple with this through various new approaches. One of the first considerations is that the National Forest System does not operate in a vacuum. A tract of National Forest land can often be considered almost as a “self-contained” entity for some planning and decision making process. But in the broader view the optimum mix of programs can only be found within the perspective of national or regional demands; other lands and resources in other ownerships; and the various social, economic, cultural and political factors that pertain. We are attempting to improve our knowledge of these factors. For example, demand analysis is needed, preferably on a regional basis, that can help match up expected needs with the resource capability of the National Forests. We have done much of this with regard to the timber situation. The “Timber Outlook” report published last fall is the most recent example of such a supply/demand analysis on a national and sub-national basis. However, we need comparable analyses of other non-timber

values and products or uses of the National Forest System that are projected for the future. Here we can draw upon studies and data generated by other organizations. But we are beginning to bring together the most reliable available data to help get the proper perspective on what constitutes "program balance" in National Forest development and management.

We are also making special studies or analyses needed to help guide policy and program direction. These are needed because in the absence of such work, the cumulative effect of numerous specific actions and decisions made independently can shape the national or regional response without rational or coherent direction. One illustration of this is the roadless area review and evaluation. This was a major undertaking that attempted to bring together one comprehensive overview of the 56 million acres in large, unroaded tracts of National Forest System lands. The other way to go would have been a continued piecemeal consideration of one area at a time. This process and the results are available in the final environmental statement on this roadless area review that was published last summer.

Another recent example is the Forest Range Environmental Study that was also published last year. This is a detailed, comprehensive overview, *portrayed on a regional as well as national basis*, of the total subject of range land use and potentials including all ownerships. This too provides a valuable perspective within which to consider program direction and balance on National Forest System programs. Copies of this study are also available.

Perhaps the best way to get at the question of program balance is to bring together in one document and one analytical framework the full range of Forest Service programs—including National Forest administration. We are well along with just such an undertaking. We call it the "Environmental Program for the Future". The report is complete in draft form now. We have great expectations as far as the EPFF is concerned. Despite the magnitude of the job and the fact that it cannot possibly meet the needs of all reviewers in terms of depth and scope and detail—we hope that it will prove to be very useful in stimulating interest and discussion of program balance.

We have a precedent of sorts in "The Development Program for the National Forests" that President Eisenhower sent to the Congress in 1959 and President Kennedy sent to the Congress again in 1961, with some modifications. One important difference is that the EPFF, as we call it, includes research, and state and private forestry programs as well as National Forest System activities.

The Congress is currently showing a lot of interest in this general subject. S. 2296 and H.R. 11320, if enacted, will require a periodic national forestry assessment and 10-year program proposals updated at least at 5-year intervals. A more intensive and comprehensive inventory of forest and related resources would also be required.

Let me describe briefly the EPFF and what it is based upon. The work began several years ago and included a great deal of input from our field people. We asked each of our Regional Foresters, for example, to put together his best estimate of the optimum mix of program activities at each of three different funding levels. With benchmarks at 1975 and 1979, and output targets for 1984. Basically it is a 10-year look ahead with specific alternatives displayed during the first 5 years.

The three levels are identified as low, medium and high. The low is the 1973-74 level continued. The high level approaches intensive management or "optimum" levels although it is constrained by what can physically be accomplished in the years immediately ahead. In other words, it does not attempt to accomplish all of the needed investment work in the National Forest System within 5 or 10 years. The moderate level is basically a path midway between the low and high levels that approximates the historical trend in the last 10 years or so in terms of total program financing. This assumed a 40 percent increase above the 1974 level by 1979.

These three overall levels at the benchmark years of 1975 and 1979 were the only constraints. Our field people could select or recommend any mix of programs at any point in time at any level—as long as their total funding level did not exceed the assigned amount in each of the three levels. In essence, the question asked of the Regional Foresters was—"Where do you and your staff want to be in terms of program mix (or program balance) at these dates and at each of these three assumed funding levels?"

There was a certain amount of broad program direction provided as reference. For example, the Framework for the Future, USDA priorities, and the President's policy directions were used to the extent feasible. However, there was ample flexibility within which field personnel could establish priorities and program balance recommendations as they perceived their own regional situation.

The data were compiled and analysed and aggregated into a comprehensive statement that portrayed one "program mix" at each of the three levels and for 1975, 1979, and in some cases 1984. The draft makes clear that there are a number of variations possible in each case. For discussion and review purposes we have identified one of these program mixes for each funding level.

The next step is to select and describe a recommended course of action from among the wide range of alternatives or options or programs mixes that exist within the framework of the three levels presented in the draft. This, of course, is the "bottom line" so to speak—the purpose of the entire endeavor. This is the step that will be underway as the draft program is reviewed and discussed in the process that will lead to a "package" or proposal for program balance that will be recommended by the Forest Service. We expect this to be completed later this year.

No one can predict just what the result of these next few months of review and discussion will bring. Hopefully, it will be a reasonably solid consensus on the path for the Forest Service to follow. Among other things it should pave the way for what most people would agree on as being a balanced program for the National Forest System. On the other hand, it may be that, due to the magnitude and complexity of the task, the environmental statement, which in fact will be the Environmental Program for the Future, may be challenged as being inadequate in terms of spelling out the alternatives, the environmental impacts, or otherwise.

Certainly, we can expect to have more public attention focused on this subject than has ever been the case before. And we think that alone justifies the efforts that have gone into this project to date. We were very pleased to have so much interest in this subject displayed at our briefing last August. More than

60 national organizations and industry groups and others participated. Oral, and written comments received later, were cranked into the process of developing the draft statement.

We expect that given the nature of the subject, continuing Congressional interest, public concern, the pressures on these lands, and the strong views of organizations such as are represented at this meeting, we will be getting a lot of help. We hope this will be the case as we seek to describe—and then implement—what in fact is a balanced Program for the National Forest System. I appreciate very much this opportunity to discuss the subject with you this morning.

## Discussion

DISCUSSION LEADER NEWBY: We have heard previous reference at this session to the fact that policies, programs, and plans to mean anything must be effectively implemented through management decision-making. We have heard of balanced multi-purpose use programs in plans. We have heard *previous* reference to dominant use.

I have witnessed the problems of forest supervisors when they sincerely try to implement these balanced programs as they come under the pressures of the various users to swing their balance toward one end or the other of the spectrum.

This session is now open for discussion.

MR. JOHN McKEAN [Oregon]: I would like to compliment the Forest Service for the progress they are making with the Unit Planning Program. In our state we see this as being a device for maintaining some quality in wildlife habitats, some quality in the human experience of recreation on the National forest lands, as well as providing for the needs of man.

One of the things that we are concerned about is for the Forest Service to develop some intermediate classifications, something in between wilderness and multiple use in the form of roads, which would better achieve our goals.

For example, I would like to know whether or not the Forest Service has given any serious thought to using those types of classifications either on a transitory basis, administratively or otherwise.

Further, I am a little confused about how we are going to make unit planning work when we are constantly being pre-empted by the Administration in such things as setting priority for a given class of animals and overriding all our evaluations.

MR. THORNTON: I appreciate your comments about unit planning. We also assure you that this is the way to go.

Ideally, we can stop the world and get off and get all the unit plans made so we would have a basis of knowledge to make better decisions. However, this is not feasible. We are moving as fast as we can but not fast enough. Now, I don't know how we can overcome some of these external pressures. Let's say that we cannot counteract them with a solid unit plan in every area. However, we are going to move as best we can.

On the question of something in between wilderness and multiple-use areas, we have such things as back country areas and we have been reluctant to propose establishing another category of land which you can draw a line around because it tends to restrict the options that future managers may need to have for this piece of land.

Now, in effect, the land as you described it—somewhere in between—is being used and managed and, therefore, I am personally not so sure we need to have a label on it.

MR. McKEAN: Of course, I realize that such classification as "back country" is being used, at least in our region, in implementing these plans. Will there be some assurance providing that the plans will not be changed in any major nature without benefit of public hearings and other public input?

You know, one of the reasons many people want to go this route is that they lack confidence in the Forest Service. If the Forest Service would provide some form of security and assurance to the people that there would be ample opportunity for public input when things are reviewed, maybe much of this difficulty can be eliminated.

MR. THORNTON: I think that is a good point.

Perhaps the only kind of assurance we can give is performance. As you may know, we are attempting to do just that. Our track record in that field is the best communication we have.

MR. HUNT: Last summer, the President's Advisory Panel on Timber and Environment recommended that the Forest Service increase its cutting rate by 5 to 100 percent. Can you tell us the present policy on this?

MR. THORNTON: Well, that was one of the twenty recommendations of the President's Panel Report. However, that, as you know, is a rather complicated subject.

The status, as of last summer, was that we had an inter-departmental task force looking at that particular question. It is not clear at the moment just whether or not that kind of inter-departmental approach will continue or not.

As you know, that report went to all public lands and not just national forest systems. We are in the process of studying and making a determination. We have received comments from all over the country and so we are at that point in time right now.

# Off-Road Vehicles: On or Off the Public Lands

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Off-road vehicles; on or off the public lands! That subject always creates comment, especially among those concerned with the natural resources of our nation. I am sure the same will be true today.

By off-road vehicle (ORV), I mean any mechanized conveyance, generally operating off recognized highways and roadways.

By public lands, I mean not only those federal lands incorporated within the great National Forest System, National Park System, National Wildlife Refuge System, the national resource lands administered by the Bureau of Land Management, but all the other recreation lands administered by Tennessee Valley Authority, Corps of Engineers, and Bureau of Reclamation. I shall, however, include some reference to ORV use on state lands, with emphasis on Interior lands.

By on or off, I mean to discuss briefly the status of our public land policy and programs today, in relation to ORV use on public lands.

Basically, the ORV problem is one of land-use management, with available lands being allocated among the different kinds of uses.

The Department of the Interior strives to achieve and maintain a balance among the varied and multiple uses of the vast and far reaching resources of Interior lands, while managing them so that there is a minimum of environmental impacts and user conflicts.

The lands managed by the Department range geographically from the Arctic tip of Alaska to the submerged coral of the Caribbean and the Pacific Islands. They encompass a wide range of environmental forms from well below sea level to over 21,000 feet in elevation, with terrain features as diverse as swamplands and desert; and public uses ranging from high density to highly dispersed.

Within the Department, four land-managing bureaus have major responsibilities for the stewardship of the natural and historic resources of the Nation. The variable missions, policies, and management philosophies of these bureaus necessitate specific handling of off-road vehicles on Interior lands. Within the context of its particular mandate, each bureau has developed regulations and safety standards applicable to the lands and resources under its jurisdiction. The land managers of these lands enforce regulations, safety standards, operating conditions and vehicle requirements, and provide information concerning the types of uses permitted or prohibited. Other federal agencies operate in a similar manner.

The Department of the Interior has been especially active in matters concerning off-road vehicles since April 1971, when Secretary Morton established a Departmental Task Force to investigate the use of off-road vehicles for

recreational purposes on Interior lands. The Task Force report released to the public in March 1972: (1) identified the problems and opportunities connected with the use of off-road vehicles on Interior lands; (2) included an examination of legislation and current policies and procedures of Federal and State agencies concerning ORV use; and (3) contained guidelines and recommendations providing a basis upon which a departmental policy could be developed for the use of ORV on Interior lands. During the review process of this report, the need for a national policy concerning ORV use became evident, and, on February 8, 1972, President Nixon issued Executive Order 11644.

The Executive Order directed all land administering agencies to establish policies and provide for procedures that will ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, promote the safety of all users of the lands, and minimize conflicts among the various uses of those lands.

In response to the Order, the Secretary of the Interior issued a memorandum on May 5, 1972, providing policy guidance and administrative instructions concerning the use of off-road vehicles on Interior lands. Notice to the public of the availability of the environmental statement on the Department's actions was published in the *Federal Register* on June 2, 1972. Further, the Department's draft ORV regulations and notice of reopening of the review period for the draft ORV environmental statement was published in the *Federal Register* on February 14, 1973. These regulations provide for procedures for the designation of specific areas and trails on which use of ORV may and may not be permitted, and prescribe operating conditions and safety standards for the use of ORV on Interior lands.

During the review process of the draft ORV regulations and the environmental statement, views differed among federal agencies and private interests as well concerning the scope of the Order, particularly its applicability to commercial interests' access to public lands. Public comment was vehement concerning approximately 16 major areas of difference, all of which were responded to by the Department in the preparation of the final ORV regulations and environmental statement.

In general, these public comments centered around (often both sides of) the following subjects relating to the various aspects of off-road vehicle use:

1. Recognition of commercial use of public lands, especially mining.
2. Open-until-closed versus closed-until-open policy regarding use of Federal lands for ORV.
3. Establishment of noise levels in decibels at specified distances.
4. The classification of ORV and establishment of areas and vehicle equipment requirements accordingly.
5. Applicability of state law; *i.e.*, operating conditions (age of operators, speed limits, etc.) registration, licensing, and inspection requirements.
6. Recognition of non-federal government interests (*i.e.*, state and local governments).
7. Recognition of non-governmental interests (*i.e.*, private individuals and groups); public hearings and participation in the rule making.
8. Designation of lands on a "one-time" basis; provide for changes.
9. Define ambiguous terms, such as "excessive speed, noise, etc."



10. Fear of "local decisions" vs. agency policy; and uncoordinated decisions.
11. Utilization of public lands for intensive use.
12. Need to accommodate all gadgets.
13. Economic benefits derived from ORV use.
14. Strengthening of family ties through ORV use.
15. Necessity for additional research concerning effects of ORV.
16. Organized ORV events.

All comments received by the Department were given careful consideration in the preparation of the final environmental statement and final regulations governing the use of ORV on Interior lands. Notice to the public of the availability of the final ORV environmental statement was published in the *Federal Register* on January 10, 1974. Likewise, the final ORV regulations of Interior bureaus were scheduled for publication in the *Federal Register* in mid February 1974.

Interior's regulations call for no major changes in the way Departmental bureaus are managing ORV use. Historically, the lands administered by the Bureau of Land Management have generally been open to the use of ORV. Exceptions to this generality are areas of unique values, such as primitive areas, natural areas, and areas of critical wildlife values, which have been closed to ORV. On the other hand, lands administered by the National Park Service, Bureau of Sport Fisheries and Wildlife, and the Bureau of Reclamation have been closed, except where designated open to ORV use. With reference to ORV safety requirements and vehicle standards, Interior guidelines are as follows:

### 1. *Operating regulations*

No person may operate an off-road vehicle on public lands without a valid motor vehicle operator's license or learner's permit. Persons under licensing or permit age must be accompanied and supervised by an older person who has a valid operator's license.

No person shall operate an off-road vehicle on public lands: (a) in a reckless, careless, or negligent manner; (b) in excess of established speed limits; (c) while under the influence of alcohol or drugs; (d) in a manner likely to cause excessive damage to or disturbance of the land, wildlife, or vegetative resources; or (e) during darkness without lighted headlights and taillights.

### 2. *Vehicle Standards*

No off-road vehicle may be operated on public lands unless it conforms to applicable state laws and regulation relating to registration, operation, and inspection. All off-road vehicles shall be equipped with adequate and operating brakes, mufflers, and spark arresters. No off-road vehicle equipped with a muffler cut-out, bypass, or similar device, or producing excessive noise, may be operated on public lands.

### 3. *Events Requiring Permits*

No person or association of persons may conduct any race, rally, meet, contest, or other type of organized events involving the use of off-road vehicles

on public lands without first obtaining a permit to do so from the authorized officer of those Bureaus that permit such events.

The three Federal land managing agencies, other than Interior, which were designated in Executive Order 11644 were the Department of Agriculture (Forest Service), Department of Defense, and Tennessee Valley Authority. Basically, the ORV regulations of these agencies are consistent with those of Interior as to noise, operating criteria, and vehicle standards.

In order to provide more insight concerning ORV use on Interior lands, I believe it would be well at this point to briefly review the missions and responsibilities of our land administering bureaus.

The Bureau of Sport Fisheries and Wildlife has the stewardship of fish and wildlife resources, with a broad range of programs for conservation, development, and management of these resources. The Bureau also provides a variety of wildlife and wildlife-oriented recreation opportunities on the 30 million acres included in the national wildlife refuges and national fish hatcheries. However, because of Bureau's primary responsibility for the protection and perpetuation of fish and wildlife resources, with wildlife-oriented public use as a secondary objective, administration of the ORV program must necessarily be more restrictive than that of some other bureaus. Travel in or use of any motorized vehicle, including land, water, ice, snow, and aircraft types, is prohibited on areas administered by BSF&W, except on specific routes for travel or in designated areas posted for public use. Areas and trails will be established only if the Bureau head determines that ORV use will not adversely affect the natural, aesthetic, or scenic values.

The National Park Service has the responsibility of promoting and regulating the use of national parks, monuments, and reservations by such means and measures as conform to the fundamental purpose of these areas. This purpose includes conserving the scenery and the natural and historic objects and the wildlife therein and providing for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations. Paragraph 3(a)4 of Executive Order 11644 specifies that areas and trails should not be located in officially designated Wilderness Areas or Primitive Areas, and that areas and trails shall be located in areas of the National Park System, Natural Areas, or National Wildlife Refuges and Game Ranges only if the respective agency head determines that off-road vehicles use in such locations will not adversely affect their natural, aesthetic, or scenic values. Based on its mandates, the Park Service must be restrictive in the administration of ORV use on its lands.

The Bureau of Land Management is responsible for the management of 452 million acres of national resource lands, located primarily in the eleven western States and Alaska. The national resource lands comprise sixty percent of all federally owned land and twenty percent of America's total land base. The Bureau applies multiple use principles in the management of its lands and generally considers the national resource lands open to public use unless closed for a specific reason. The wise use of the land and water from which these resources and benefits are derived is the overriding premise on which the Bureau's management programs are founded. In implementing its land-use planning system, the Bureau will evaluate all of its lands and resources to

determine the best use under the multiple-use concept. In this process, management decisions will be made as to whether its lands should remain open to ORV use with certain restrictions or closed to such use. Public participation will be solicited on each area prior to its designation as open (with controls) or closed to ORV use. An environmental analysis will be prepared to evaluate the effects of the action. ORV use will be confined to areas and trails that have been designated as open to their use and in such locales will be subject to certain controls.

The Bureau of Reclamation's mission includes the development of water resources for the western States. Thus, some 248 recreational areas on Reclamation projects in the 17 western States include over 3.8 million acres of land and 1.7 million acres of water that are available for public recreation use. Currently, annual use approximates nearly 56 million visitor days for a wide variety of activities, including ORV use. Recreational administration of most of these areas has been assumed by other federal and nonfederal agencies under formal agreements with the Bureau. ORV use will be limited to those areas for which appropriate regulations are implemented to control such use in a manner consistent with other recreation activities, needs for erosion control, vegetative protection, wildlife protection, and requirements relating to other authorized project purposes, including power production, flood control, irrigation, and other purposes.

To assure that actions of Interior bureaus are compatible, the Bureau of Outdoor Recreation has the overall responsibility to:

1. Coordinate the development of consistent policies and regulations governing ORV use on Interior lands and provide liaison on these matters with the Department of Agriculture, Department of Defense, and Tennessee Valley Authority; and,
2. Provide technical assistance to all Interior bureaus, other Federal agencies, the states and their local governments, and the private sector in coordinating, planning, and programming for the development of areas and facilities for the use of ORV.

As we see it, the problem faced by the Department of the Interior is that of providing balanced policies and procedures that will best protect the resources, promote the safety of users and non-users, and minimize conflicts among the various uses of these lands. Our recent experiences have indicated that ORV user interests on Interior lands can be balanced only through positive programs recognizing the differences in agency missions, the environmental effects of ORV, and the establishment of designated areas and trails and specialized sites for certain ORV uses.

At this point, permit me to cite ORV action by the Forest Service. In the news release of October 5, 1973, the Forest Service announced that by the end of 1976, ORV enthusiasts will know where they can, and can not, use trails and areas throughout the National Forest System. Public participation in the opening and closure action is assured. Currently, about 8,000 of 80,000 miles of trails outside wilderness and primitive areas are now closed to ORV to arrest resource damage or alleviate use conflicts. Also, some 14.5 million acres of wilderness and primitive areas and about 4.8 million acres in 395 special purpose or damage-prone areas are closed to ORV use.

The Corps of Engineers manages about 5 million acres of land and 6 million acres of water at 390 water resource projects. In 1972, 328 million recreation days of use were recorded at these projects. The use of off-road vehicles has gained in popularity significantly over the past several years. The Corps recognizes the use of ORV as a legitimate recreation activity and has designated a number of areas for this activity. Regulations issued by the Corps for management of ORV require significant public involvement.

The Tennessee Valley Authority has designated Turkey Bay a major ORV area within the Land Between the Lakes. Off-road vehicles of all kinds, including trail bikes and mini-bikes may be operated within the posted boundaries, as specified in the regulations. The area is not available for competitive events sponsored by any organized riding groups. Mini-bikes and small trail bikes may be ridden on marked trails and within posted boundaries in areas designated at the Piney and Hillman Ferry Campgrounds.

I want to review some of Interior's specific ORV developments and to mention a few of the States which have taken the lead in enacting legislation concerning ORV use and the provision of areas and facilities to meet the needs of ORV enthusiasts.

In the West the National Park Service permits snowmobile use in Yellowstone and Grand Teton National Parks. However, only existing roads, trails, or open areas will be used for snowmobiles.

Also in the West, areas and trails which BLM has open to ORV use include: (1) The Garnett area in Montana: 100 miles of ungroomed snowmobile trails, located about 40 miles east of Missoula; (2) In Idaho: Two cycle trails out of the Boise area which connect the outskirts of Boise to the top of the Boise front and make connections to a U.S. Forest Service trail; (3) Also in Idaho near Emmett, there is a 6,000-acre area, used strictly for motorcycles and grazing. About 3,500 acres of this area are the private property of one rancher, and 2,500 acres are BLM lands. We have a three-way cooperative agreement among the ranchers, an association of motorcycle clubs, and BLM. The motorcycle clubs have a lease with the rancher, and BLM has a cooperative agreement with the rancher and the clubs. This land is located from rim to rim in a canyon, and the bottom of the canyon is used for moto-cross. From the bottom of the canyon up the hillside, several hill-climbs have been developed. Trails run from the bottom of the canyon to the rim and along the rim of the canyon; (4) In Nevada north of Las Vegas, 7,000 acres have been opened to the use of cycles; and (5) In California: in the southern third of California east of the coast range, BLM has developed an interim recreation vehicle management program. This will eventually lead to part of the California Desert Plan covering a whole range of programs for all types of uses. This area comprises over 12 million acres, of which: 14 areas are open (over 1 million acres); 16 areas are closed (about 800 thousand acres) because of primitive, aesthetic, or wildlife values; and 41 areas are restricted (about 10 million acres), with the ORV use restricted to existing roads and trails. The areas are open year-round, and average from 9 to 10 million visitor use days annually.

Of particular interest are the "sand or land sailers," which can be found anywhere that there are dry lake beds or flat dry areas in the western states where the winds are usually good. Two examples are the dry lake beds in California, and Bonneville Salt Flats in Utah. These ORV are three-wheel

vehicles made like ice boats, with big sails, and generally hold one person. With good winds, they can reach a speed of 70 miles an hour.

Although time does not permit being all inclusive concerning either the federal or state ORV programs, let me briefly mention some of the snowmobile and other types of ORV programs at the state level. Michigan, Minnesota, and Wisconsin are examples of three states which have good snowmobile trail development programs. In Michigan, the program is centered around state lands and two years ago a distributor made available ten large groomers at no cost to groom trails on state forest land and parks. Last year, the Michigan Department of Natural Resources bought the groomers and this year they bought five more. This season they plan to groom 2,000 miles of trails on state lands.

Minnesota and Wisconsin have programs allowing for the return of a portion of the money acquired from machine registrations for the use of trail developments. Counties may apply for these funds from the Department of Natural Resources. In some cases there are provisions for clubs to contract the work required to construct a trail.

Now to touch on state legislation concerning off-road vehicle use other than snowmobiles, let me briefly discuss recently enacted laws of the states of California and Washington. The state of Washington's All Terrain Vehicle Act of 1972 (Title 46, Motor Vehicles, Chapter 46.09 RCW) requires ATV owners to obtain annual ATV Use Permits from the Department of Motor Vehicles, at a fee of \$5.00. The DMV may retain up to 18 percent of the use fees collected to cover administrative expenses. In addition, the Department of Natural Resources may use up to 5 percent of the use permit fees for administrative costs in implementing this legislation. The remaining funds from fee collections must be deposited in the outdoor recreation account of the general fund, to be distributed by the Interagency Committee on Outdoor Recreation to the various departments of state government, counties, and municipalities, on a basis determined by the amount of present or proposed ATV trails or areas on which they permit ATV use. The funds must be used for expenses covering planning, development, acquisition, and management of ATV recreational areas and trails. Under other legislation (Substitute Senate Bill No. 372, Chapter 47, approved 5/5/71), the Interagency Committee on Outdoor Recreation has the responsibility for preparing a state trails plan as part of the statewide outdoor recreation and open space plan. Included in this plan shall be an inventory of existing trails and potential trail routes on all lands within the state of Washington presently being used or with potential for use by all types of trail users.

The State of California's Off-Highway Vehicle Act of 1971 (Assembly Bill No. 2342, Chapter 1816, approved 12/22/71) provides for the identification of specified motor vehicles used off the highways and requires such vehicles to be issued and to display an identification plate. The law also created an Off-Highway Vehicle Fund continuously appropriated in specified proportions for use of the Department of Parks and Recreation to provide trails and areas for off-highway vehicles. An amount not to exceed 50 percent of the total revenues of the Off-Highway Fund shall be made available for grants to cities, counties, and appropriate special-purpose districts for recreation projects for off-

highway vehicles in accordance with local government planning and statewide plans for trails for recreational motor vehicles developed by the Department of Parks and Recreation. To be eligible for these funds, local governments shall provide matching funds in an amount of not less than 25 percent of the total expense of the ORV facility. The remainder of the funds contained in the Off-Highway Vehicle Fund shall be used by the Department of Parks and Recreation for purposes of funding recreational areas for the use of such vehicles, and trails for the use of these vehicles.

In conclusion, I would like to emphasize that the increasing use of ORV in recent years and the issuance of executive Order 11644 have created a tremendous response throughout the nation. Both user and nonuser groups have written to the President, the Congress, and the involved federal agencies. The views have been mixed, with ORV proponents considering the Order too restrictive and ORV opponents considering it too permissive. Emotionalism seems in the forefront among both ORV users and nonusers, and even among some land managers. More fiction than fact exists regarding ORV environmental effects, and generalizations are no help on this matter. But, notwithstanding all this, public policy recognizes those who would have ORV, both on and off the public lands.

The land managers within the Department of the Interior are faced with increasingly difficult problems in fulfilling the missions of their agencies, and yet meeting the public needs for increased recreation opportunities. Our concerns include all aspects of these interests and we shall continue to cooperate with all of the public and private sectors. We believe that our policies and regulations can meet our challenge.

## **Discussion**

MR. FISCHER [Las Vegas, Nevada]: Would the speaker care to discuss the importance of enforcement authority to BLM?

MR. DAVEY: Of course, I cannot speak for the Bureau of Land Management but I am well aware of the point you make.

It is true that they need enforcement authority. Hopefully, the so-called Organic Act will soon get through the Washington Mill but, certainly, that is one of the major problems the BLM faces.

I might also say that the BLM people have done a remarkable job in making the best of a very volatile situation.

MR. BENNETT [Southern California]: I would strongly urge the people in Washington, D.C., to come out and see some of the Southern California battleground. When you attend hearings where 1200 people in a room are violent over regulations the BLM is putting forth, you can understand the problems involved.

They have closed very little of our desert and the destruction that has gone on and is continuing to go on is unbelievable.

I am an ORV user and I feel much education needs to be done in regard to their use. In our county, for example, the County Board of Supervisors appointed a Citizens Advisory Committee, of which I am a member. We have been, for three years, attempting to locate park sites within our county. Our Committee is practically polarized, although we have been able to give much information out to all of the organizations, both conservation and otherwise.

I would urge you to come and visit us and take a personal interest in this. I know that the BLM personnel have a tremendous job out there and I admire them for taking it on.

MR. MUNTHNER [Forest Service, Idaho]: I would like to express our appreciation to the ORV organized groups in our area in developing and planning a unit plan for the National Recreational Area. We find that the ORV organized groups were very willing to make some concessions and they had their own feelings about what should be open and closed.

Of course, some polarization tends to develop and we are unable to give definitive answers as to why we have closed some areas. As you mentioned, there is a lot of friction regarding the ORV environmental effects.

What are present plans for coordinating research efforts in order to help give us definitive answers on environmental effects, particularly as to intensity of land use, and effect of intensity of use on wildlife, particularly species like elk, mountain goats and sheep?

MR. DAVEY: Unfortunately, the Bureau of Outdoor Recreation has not been able to finance much research. I cannot address that without going into points I would rather not get into. However, there was a concerted effort, a year or two ago, to get something going and we did not succeed because of financial constraints that face us all.

Certainly, there is some research going on. There is not enough, I am sure, but we are looking forward to the results of work in Michigan going on at the moment. Further, the snowmobile people have reported a fair amount of research. The motorcycle people have supported some.

The BLM is working with Utah State in designing a research program and I think you will see more coming down the road shortly.

However, I agree with you, that what we have available at the moment is not adequate and, of course, BOR is the focal point for coordination. We have never been funded and have not completed research programs, but I can assure you that we will continue to push for research. Hopefully, in the years to come, we will succeed.

# Planning Alaska's Future

Burton W. Silcock,

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America is now witnessing a revolution in the perception of its most basic resource—land. The revolution is manifested by recent legislation such as the Environmental Policy Act, and proposed laws such as the Strip Mining Act, Surface Mining Reclamation Act, National Resource Land Management Act, and the National Land Use Policy Act. Land use planning is the subject of a growing number of national symposiums. As a nation, we are concerned about how we use our lands. This is quite apparent in Alaska, where the most massive redistribution of land ownership and control ever to take place in this country is now underway. This is a result of the Alaska Statehood Act of 1958 and the Alaska Native Claims Settlement Act of 1971.

The Joint Federal-State Land Use Planning Commission for Alaska was created by passage of the Native Claims Settlement Act. As a joint Federal-State commission, it is equally financed by the State and Federal Governments. This is a 10-member commission—5 representing the State of Alaska and 5 Federal members, 4 appointed by the Secretary of the Interior and the Federal Co-Chairman appointed by the President. All of the members have lived in Alaska and possess considerable knowledge and great interest in the State. The Commission provides a forum in which the ownership and uses of various areas within the State can be discussed and recommendations developed. At the forefront are the interests of the state, native people and the nation. The Commission is charged with fostering intergovernmental cooperation in land use planning. The proposed National Land Use Policy Act envisions establishing similar commissions for each state. Alaska could be considered a testing ground.

The Alaska Native Claims Settlement Act paved the way for the ultimate acquisition of land authorized for State ownership by resolving the blanket land freeze which, in one form or another, had been imposed on vacant, unappropriated, and unreserved lands of Alaska since 1966.

The Native Claims Settlement Act and the Statehood Act established total acreage entitlements of slightly more than 104 million acres for the State and 40+ million acres for Alaska Natives. These claimants have yet to stake permanent ownership to significant portions of their entitlements. Time is running, however, with the selection by Native organizations to be completed by December 1975 and the State by 1985. The Settlement Act also directs the Secretary of the Interior to identify up to 80 million acres of land to be included in the four national land management systems: Parks, Forests, Fish and Wildlife Refuges, and Wild and Scenic Rivers. Ultimately, Congress will decide the matter.

Let's look at land ownership in Alaska prior to the Settlement Act and a projection of the land ownership patterns by 1985:



Of Alaska's 374 million acres, only 1 million acres—about three-tenths of a percent—was private land in 1970. At completion, and including Native selections, private lands will total about 42 million acres—or 11 percent of Alaska. To put this in perspective, this is nearly as much land area as the State of Washington or all of the New England states.

By 1970 the State had selected 26 million acres. Upon completion of the selection process in 1985, state lands could total up to 104 million acres, or 28 percent of Alaska.

Federal lands totaled 334 million acres in 1970, of which 92 million acres were federal reserves and 242 million were public domain. By 1985 federal reserves will amount to about 170 million acres. Public domain lands will be about 43 million acres. That is a reduction in Federal ownership from 89 percent to 58 percent.

The Commission plays a primary role in land selection under the Alaska Statehood Act and the Alaska Native Claims Settlement Act. It seeks to avoid conflict between State and Native selections. Further, the Commission has identified those lands which it believes should be studied for possible national parks, wildlife refuges, forests, or other national purposes.

In relation to Native land selections, the Commission is assigned the task of defining public easements to assure the right of public use of these lands for transportation and utility purposes.

The administration of both state and federal lands in Alaska comes under Commission review with an eye toward recommending desirable changes in laws, policies, and programs.

In addition, the Commission is charged with assisting Native groups and the State of Alaska with land use planning to insure the orderly economic development of the state consistent with state and federal environmental objectives.

All of this, of course, requires that the Commission engage in sophisticated and wide-ranging land use planning for the lands of Alaska.

So far, the Commission has made two sets of recommendations to the Secretary of the Interior as provided in the Claims Act.

First were recommendations identifying which lands should be withdrawn by the Secretary as National Interest Lands under the Act. These are lands which would be studied for possible additions to national parks, wildlife refuges, scenic rivers reserves, and forests.

The second set of recommendations, submitted to the Secretary of the Interior last August, dealt with land uses on these 80 million acres of National Interest Lands—referred to as d-2 lands. Primary resources were identified and recommendations on the use of these resources were made to the Secretary.

... Approximately 13 million acres in the Yukon Flats and Yukon Delta were designated as waterfowl habitat. However, other uses could be permitted under strict controls.

... Four million acres along the coast, on coastal islands, and in the Lake Iliamna area were outlined as important fish and wildlife habitats.

... Twenty-two million acres were identified for recreational values. Unique scenic areas including parts of the Brooks Range, Mt. McKinley, and the Wrangell and Chugach Mountains are among these lands.

... Of the 80 million acres covered in the Commission's recommendations, some 60 million would be open to mineral exploration and development. However, here the Commission strongly urged that mining on these lands should be managed under a permit and lease system. The Commission is developing a workable permit and lease system for these lands to be included in its recommendations to Congress.

... The remaining 20 million acres would be closed to mining activity.

... With the relatively minor exception of 3 million acres, all the National Interest Lands would be open to hunting and fishing. The closed areas are located in the Brooks Range, McKinley Park, and in the Wrangell Mountains.

... Finally, some 37 million acres would remain open to a great variety of uses.

Briefly, these were the Commission's recommendations to the Secretary of the Interior.

To assist in formulation of the recommendations on the 80-million-acre withdrawal and other responsibilities assigned by the Act, the Commission has a team of approximately 40 professionals. This team is made up of personnel from the State of Alaska and federal agencies, with training in law, minerals, recreation, wildlife, transportation, and planning. We also have a 15-member Advisory Committee made up of citizens from throughout the State representing various walks of life. This committee has assisted us as a sounding board on planning approaches.

From the beginning of the Commission's work a year and a half ago, the Commission sought to approach its specific tasks with a careful and informed consideration of the differences among the State and Federal Governments and Native groups. In formulating its recommendations for the National Interest Lands, the Commission held more than 30 public hearings from Barrow to Washington, D.C. I do not believe that any agency—public or private, Federal or state—has gone farther or sought longer for citizen participation in the decision-making process. This is an aspect of the Commission that I am sure will continue.

The Claims Act called on the Secretary of the Interior to designate up to 80 million acres of Alaska as National Interest Lands and to recommend to Congress those lands suitable for national parks, forests, wildlife refuges, and as wild and scenic rivers. Those recommendations were filed with the Congress last December, as required.

The Secretary's recommendations covered some 83 million acres:

... He would place 32 million acres into the National Park System, thus creating eight new parks and expanding two existing parks. The parks would be closed to mining and oil and gas leasing. Hunting would be permitted on a limited basis, subject to continual review.

... Another 32 million acres would be set aside in 10 new wildlife refuges, under the Secretary's proposal. Hunting would be allowed in the refuges while mineral extraction would be managed under a permit and lease system.

... Four new national forests totaling about 19 million acres would be created under the Secretary's proposal. They would be managed on a multiple use, sustained yield basis.

... One million acres would be added to the Wild and Scenic Rivers System.

The Secretary recommended management systems for the lands of Alaska.

The Commission based its work on the resources and their uses. However, as the various legislative proposals on National Interest Lands proceed through Congress, the Commission will make its recommendations on management of those lands.

The Congress has set itself a deadline of five years to consider the recommendations of these National Interest Lands in Alaska. Although the Commission has developed preliminary recommendations—those are the ones which were submitted to the Secretary—it will continue to refine its recommendations and work with the appropriate congressional committees throughout the period of congressional consideration.

One of our commissioners, Joe FitzGerald, states it very clearly—“What is required of us is a clear view of the way ahead and a dedication by all of us to the proposition that development must go forward to provide economic opportunity, but that in the process, the *quality* of life must not be lost. As an underdeveloped area where the land and its resources are just being brought into use, we have a unique opportunity to achieve this goal.”

I personally believe that our dynamic concept of land use must be balanced—it must utilize different land resources on a planned basis to insure that the highest value for both social and environmental land uses will be appropriate both now and in the future.

The Land Use Planning Commission for Alaska has a life span of five years. In that time, of which only three years remains, it is striving to succeed in maximizing the opportunities open to all of us, and to future generations, for aesthetic, economic, and scientific use of publicly owned lands in Alaska.

With the interests of the people of Alaska and the Nation foremost in our minds, the Commission is determined to form a viable land use planning pattern that will provide an optimum plan for Alaska today and tomorrow. In this way we can set an example for the Nation in years to come.

## Discussion

DISCUSSION LEADER NEWBY: Those of us from other states cannot help but wonder what our situation might be if such a commission had existed at the time the public domain in our states was distributed. Where these claims are concerned, we can only wish Alaska good luck, considering the problems some of our states are faced with in relation to native claims.

MR. PETE NELSON [Alaska]: I would like to comment, Mr. Silcock, on what I think is an excellent overview of the problem.

As a point of information, it is hoped that next year at Pittsburgh we can have a similar overview, only at that time we can bring before the group the controversies which may exist between your recommendations and those of the Secretary. I think this is extremely important. Furthermore, I have reservations that Congress will resolve this by next March.

I might explain another point of information in relation to the Environmental Impact Reports. I think what they contain and their availability would be of interest to this group. Would you care to comment further on that?

MR. SILCOCK: The impact reports referred to are those submitted by the Secretary with his legislative package to Congress. There are some 28 reports covering 28 different areas—designating them either as potential wildlife refuges, parks, forests, or wild and scenic rivers. All of these went, as a package, to Congress in the form of an environmental impact statement.

The Commission is reviewing these and I am sure they are available through the Department in Washington. If you have any question as to where you may get them,

contact your closest departmental office. I am sure they can refer you to where you can at least obtain them to read. They were distributed throughout the West in some of the regional areas, to libraries and so on.

DISCUSSION LEADER NEWBY: Are there further questions of Mr. Silcock?

MAITLAND SHARPE [Izaak Walton League]: Reviewing these impact statements is going to be a major job.

They weigh 37½ pounds. I weighed mine the other day to find out what was ahead of me. Further, we have until July to comment on most of the impact statements.

My question has to do with the basis of the Commission's recommendations to the Secretary.

As I understand it, some of the Commission's recommendations were predicated on the optimistic assumption that Congress would undertake a major revision of the National Mining and Mineral Leasing Laws. Mr. Silcock referred this morning to the fact that the Commission is coming out with recommendations for a permit and leasing program.

I wonder if he can tell us more about the recommendations and if he would care to comment on whether the Commission has considered coming out with a second contingency plan or set of recommendations based on the assumption that the mining and mineral leasing laws will not in fact be fundamentally revised by Congress?

MR. SILCOCK: The Commission's recommendations were based on the overall information that was available. They did not develop new information. They did assemble, through their planning people and staff, all available data they could find on the resources of the state. This was the basis of recommendations to the Secretary.

They wanted him to be fully aware of the resources and then, through the hearings process, they identified uses made of these resources and those areas, so that he could then take into consideration in his final recommendations to Congress concerning designation of those areas.

With regard to follow-up recommendations, we are presently moving into a regional planning process. We divided the state into six regions based on hydrologic regions and sub-regions and we are moving as fast as we can into a regional planning process wherein we will bring together various land managers and owners, native people, state people, bureaus and the federal state agencies into a planning process and try to develop some coordinated land-use plans for these areas.

If you look at the map of Alaska, the land ownership pattern is perhaps the worst thing that has happened in the distribution of public lands. As a matter of fact, every mistake we made down south was made up north. Therefore, the only way I can see to resolve some of these problems—and I am talking about checkerboard land patterns—is on a township basis instead of a sectional basis. Therefore, we need to get involved in the business of coordinating land use planning and blocking up the land ownership. This is where the Commission is starting to move and we hope to get that initiated soon so that we can also respond to Congress as this moves through the various Congressional Committees.

There was a considerable amount of interest in the mineral leasing program. The Commission held a seminar last December involving some 25 different persons from various walks of life, all experts in this field from the environmental and departmental sides, to try to see if we could come up with a workable lease and permit system as it relates to hard rock mining.

We think we have developed that. We are still working with it and will be using that as we make our recommendations to Congress. Hopefully, in the legislative process some of this will be included so that there will be some reflections of the work that has gone into that study.

The Secretary also came out with a lease and permit system and, at least in his recommendations on the refuges, this is something new, something that has not existed before.

Here again I am talking about hard rock mining and not the oil and gas leasing business. Therefore, that is about where we are.

# Conservation in Mineral Development: Why Be Concerned?

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## Introduction

It is not the purpose of this paper to discuss the question of whether a given mineral deposit should be developed, whether there should be more efficient use of a mineral, whether rate of growth in use of a mineral or its products should be slowed or the use of a mineral even be decreased, or whether recycling should be encouraged. These are important questions and, personally, I am happy to see that they are finally being addressed, particularly in the energy field.

It is the purpose of this paper to suggest that environmentalists, conservationists and the public generally ought to be as concerned over *how* a mineral deposit might be developed for total recovery of the mineral resources as they are to questions on environmental impact. It also urges that society ought explicitly to consider mineral recovery aspects along with other social, economic, and environmental benefits and costs in decisions concerning proposed mineral developments rather than allowing the maximization of private economic returns to be the sole criterion.

## Past Concepts

In the past and even at the present time, in most cases, the percentage recovery of mineral deposits in development is based almost wholly on economics. Since almost all deposits are developed by private enterprise, most of these decisions are based on benefits (profits) to individual companies (micro- or theory of the firm economics) rather than consideration of social benefits and costs (macro- or welfare economics). Most mineral companies use present value methods (such as discounted cash flow (DCF)-rate of return) to evaluate the economic potential of mineral developments (Bureau of Land Management 1970). Since these methods discount future income, they tend to give greater importance to immediate income than to potential income in the distant future. In turn, this tends to encourage "high-grading" or the utilization of the higher grade material first.

It should be noted, however, that many mineral companies do consider lower grade material in their plans and, sooner or later, recover the lower grade material. Improved technology or higher prices have also had a great impact

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<sup>1</sup>The views presented herein represent those of the author and not necessarily those of the Bureau of Land Management or the Department of the Interior. The author is indebted to many individuals too numerous to mention here for their comments on an earlier draft.

on recovery of low-grade material. The leaching of low grade copper and uranium "ores" are two examples of recovery through this type of process. However, even here these decisions are usually based on internal company economics, usually of marginal cost versus marginal gain variety. According to Mineral Economist David B. Brooks, a mining company will usually cease investing in an existing mine whenever it does not anticipate a rate of return that is greater than about 12 percent per annum and will close an operation (or part thereof) when returns are insufficient to cover out-of-pocket expenses (Brooks 1971). However, see Evan Just's article wherein he states metal mining companies are not "high-grading" but rather "low-grading" (that is mining excessively low-grade deposits)—as measured in economic returns (Just 1973).

It might be argued that it really doesn't make any difference if deposits are "high-graded" since the lower grade material is still there and can be recovered later when it becomes profitable. However, this is not always true because the method of development and/or use of the mineral might preclude later recovery because of either technological problems or excessive costs.<sup>2</sup>

There is also the case of by-products lost (e.g. helium in natural gas) through extraction and use of the main mineral product (Brooks 1965, Metz 1974).

It is my impression that in the past when environmentalists or conservationists discussed proposed mineral development, they have been almost wholly concerned with potential environmental impacts and have not really looked at mineral recovery aspects.<sup>3</sup>

The recent debate over surface mining versus underground mining of coal, to be discussed later, is an excellent case in point. If the "real" costs (including social costs) are included in the cost of surface mining, perhaps environmentalists may become more interested in this recovery aspect.

In view of the tremendous reserves and resources of energy minerals (coal, oil shale, geothermal resources, tar sands, oil and gas) and other minerals on National Resource Lands, other federal lands, and in reserved mineral rights, and in view of the apparent greatly increased demand for these resources in the future, it is very appropriate that we review recovery aspects of their possible development.

With the existing energy shortages and likely pending shortage in many other mineral commodities, the question is: Can we, in the future, afford such short-range and perhaps short-sighted approaches as were used in the past?

## **Examples of Wastages in Recovery**

### *1. Oil & Gas*

#### *a. Natural Gas*

Natural gas continues to be flared (burned into the atmosphere)—most often when it is produced as a by-product of oil production. One example is the

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<sup>2</sup>In Minnesota it is illegal to store lower grade iron waste from iron ore mining on top of relatively higher grade (but still submarginal) rock that might some future day become ore.

<sup>3</sup>For an excellent discussion of both mineral conservation and interrelated environmental conservation, see *Conservation of Mineral and Environmental Resources* (Brooks, Tough and Buck 1970). Robert Dennis of Zero Population Growth points out that some environmentalists have attempted to look at the total resources-environmental picture including suggesting increased use of Eastern low-sulfur coal.

Hilight field in the Powder River basin (Campbell County), Wyoming. The field was discovered in February 1969 and quickly became a large oil producer. In this field natural gas came as dissolved or casing head gas along with the oil. The gas was released when the oil reached the surface. Because there was no economic way to store or collect the gas and no pipelines or gas processing plants existed, the gas was flared. This was strictly a private economic decision since the produced oil brought an immediate return on the minimum investment whereas shutting down production until gas could be utilized, or reinjecting it, would have involved delays in obtaining the income and required additional capital investment.

Eventually gas pipelines and gas processing plants were completed and the flaring stopped in 1972. However, according to an *Oil and Gas Journal* article, as of August 1970, 10.6 billion cu. ft. of gas has been flared. At field value of 12 cents per thousand cubic feet, \$1,272,000 worth of gas was flared in the period of 1½ years. Delivered gas, of course, would have been worth much more and field prices are much higher at present. The 10.6 billion cubic feet could have supplied the entire Denver metropolitan area for 13 days similar to January 6, 1971 when the average temperature was zero. Large amounts were flared from August 1970 until the gas processing plants were completed. As much as 60 million cubic feet per day were flared—equivalent to 22 billion cubic feet per year. Another factor was the premature loss in pressure in the field—after only 2½ years, pressure maintenance was required to provide an “adequate” recovery. It has been estimated that without gas reinjection, 3 to 30 million barrels of oil would have been lost. It should be noted that the Hilight field is perhaps one example where the State Government did take some action to regulate this wastage which otherwise would have been much worse.<sup>4</sup>

Another example is “The appalling waste of gas resources of the Middle East Countries—” mentioned by Gardner in a recent *Oil and Gas Journal* (Gardner 1974).

Can we afford this kind of waste when there is such a shortage of natural gas, the cleanest fuel in use?

b. *Oil (Petroleum)*

The recovery aspects of oil production are difficult to cover in a short space. (The reader is referred to Lovejoy and Holman 1967 and McDonald 1971 for comprehensive discussions.) It is sufficient to say that oil conservation has been regulated by the State Governments under the “guidance” of suggestions from the Interstate Oil Compact Commission (IOCC). Periodically the Federal Government approves continued operations of the IOCC.

One method of measuring oil recovery is Maximum Efficient Rate (MER) of production which theoretically is an engineering concept to maximize recovery

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<sup>4</sup>References on the Hilight field are:

- Oil and Gas Journal*
- November 2, 1970, p. 46
- June 7, 1971, p. 28
- September 6, 1971, p. 59
- Western Oil Reporter*, April 1971, p. 35
- Denver Post*
- January 8, 1971, p. 30
- May 4, 1971

of oil from a reservoir. There are, also, economic aspects. (See Lovejoy and Holman, p. 202). Also, the MER concept has been significantly modified in practice. Overall average cumulative oil recovery efficiency was about 32 percent in 1973 (Elkins 1973). Depending on field characteristics, in many cases tremendous additional amounts of oil could be recovered by different development and recovery practices. An estimated 40.2 billion barrels of oil (130 percent of proved reserves) could have been recovered by secondary recovery methods that were considered uneconomical in 1962 (See Lovejoy and Holman, p. 196).

The recent removal from price control of oil from "stripper" wells should result in a significant increase in production from that source.

Other things which might be done to increase recovery from new and existing oil fields include:<sup>5</sup>

(1) Where divided ownership exists (the usual case), impose mandatory unitization as soon as field is proven.

(2) Determine the field MER as soon as possible.

(3) Set maximum field allowables based on MER.<sup>6</sup>

(4) Allow unit operators free choice as to development well spacing (except for environmental impacts of well location) and production rate within field allowable.

(5) Prohibit extensive flaring of associated natural gas. Require that it either be reinjected or utilized.

(6) Closely monitor to determine when changes are needed.

(7) Require secondary and tertiary recovery operations when feasible (perhaps supported by incentives of various types).

## 2. *Wastage in Potential Mining and Recovery Practices*

### a. *Coal*

#### (1) *Kaiparowits Plateau Coal Deposits, Utah*

The Kaiparowits Plateau in the Canyon Country of South Central Utah contains huge reserves of high quality coal. The coal is high Btu, low sulfur, moderate ash. The coal occurs in up to 15 separate seams, four or more of which are persistent and mineable. Coal seams from 20 to 50 feet thick have been encountered by drilling. The mineable beds are covered by several hundred feet or more of overburden and, for the most part, would require underground mining methods. Resources of from 15 to 40 billion tons have been estimated (Doelling and Graham 1972).

If conventional coal mining methods were to be used, original estimates indicated that only 5 to 15 percent of the total coal resource and perhaps 14 to 30 percent of one coal bearing zone could be recovered (Hewitt 1971). This is considerably lower than the average recovery of 57 percent of the mined area for the conventional underground mining of one coal seam of normal thickness

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<sup>5</sup>For a slightly different approach see Proposed Outer Continental Shelf Order No. 11, U.S. Geological Survey, *Federal Register*, p.17853, et seq. July 5, 1973. See also Stephen McDonald's proposals in *Petroleum Conservation in the United States: An Economic Analysis* (McDonald 1971).

<sup>6</sup>The Province of Alberta, Canada, sets well allowables based in large part on recoverable reserves per acre. (McDonald 1971)



(10 to 12 feet) (Lowrie 1968). The reason for these low original recovery estimates was that current technology would have allowed recovery of only part of one thick seam and that mining of overlying and underlying seams would be more difficult, if not impossible, technologically, and/or economically infeasible.<sup>7</sup>

Since a large part of the coal resource was leased by the Federal Government some time ago, the question of approving mining plans with such recoveries has been raised. Present estimates of recovery are higher than earlier estimates but still low in terms of total resource (Mining Work Group 1972).

## (2) *Strip Mining versus Underground Mining*

One of the present major controversies concerning coal development in the United States and particularly in the West, is whether mining should be allowed and, if allowed, whether underground (deep) mining should be required instead of strip mining. Senator Mansfield has introduced an amendment to the Mined-Land Reclamation Bill (S.425, 93rd Congress, passed Senate) that would prohibit surface mining of federal coal where the surface has been patented to private individuals.

While admittedly the environmental impact of surface mining can be significant and needs consideration in any decision, society should also consider the cost (both economic and in loss of resource) of somewhat arbitrarily opting against surface mining. (This is not to say, of course, that underground mining is not appropriate where surface mining is not feasible.)

In the first place, in some cases underground mining is just not feasible under present technology because of thick seams or unsuitable roof conditions. Also, underground mining is not free of environmental impacts (e.g. subsidence and disruption of aquifers) and social impacts (e.g. increased rate of accidents).

Secondly, even if underground mining is technically feasible, the recovery aspects need to be considered. Underground mining recovery averages about 57 percent of one seam of normal thickness (up to 10 to 12 feet). If there are multiple seams, or extremely thick seams, the recovery of the total coal resource using conventional mining methods is much lower, even as low as 5 percent. As mentioned in the earlier example, the future recovery of the remaining coal can also be questionable.

Strip (surface) mining can recover 90 to 95 percent of the seams being mined. U.S. average is about 85 percent. A specific example is an area near the Big Horn Mine north of Sheridan, Wyoming. Underground mining in the area recovered only about 7 percent of the total coal resource while strip mining is recovering 90 percent or more.

(Surface mining of coal can be done by conventional strip mining or open pit methods. In strip mining large draglines or shovels are used to remove overburden in one pass whereas in the open-pit method small shovels and trucks are used to remove the overburden, possibly in a series of benches. One mine in the Powder River basin in Wyoming plans to use open pit methods whereby overburden up to depths of 280 feet will be removed. The coal seam

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<sup>7</sup>See pp III-64 to III-69 of Draft EIS on Proposed Coal Leasing for a more detailed discussion of the problems of multiple seam mining (Bureau of Land Management 1974).

at the deposit is so thick the thickness ratio of overburden to coal is only four to one. The 280 feet compares to overburden depths of about 150 feet or so removed using conventional stripping equipment. The open pit alternative method of surface mining recovery could increase recovery and should be considered in decisions affecting recovery of the coal resource.)<sup>8</sup>

Consider the recoveries of mining a 100-foot thick seam near the surface by either underground or surface methods. About 90 percent probably could be recovered by surface methods. There is no experience in underground mining of such thick seams in this country. Maximum mining thickness using conventional underground mining methods would probably be about 10 to 12 feet, with a recovery of 60 percent of that mining thickness. Overall recovery of the total 100-foot seam could be as little as 5 percent. Perhaps long wall methods could be used for higher recovery; however, this has not been proven in commercial practice in this country (Development of long wall methods in thick seams certainly seems called for) (Collier 1972).

Assuming the worst case, the difference in recovery between surface and underground mining could amount to as much as 90 percent of the total in the seam. For the 100-foot seam example, using underground mining might involve the loss of 90 million tons of low sulfur coal per square mile. This amount could supply a one Megawatt capacity generating plant for approximately its amortization life. Expressed another way, at a value of \$1.75 per ton loaded in unit trains, this figure represents a total mined value of \$150 million per square mile. Are we really ready to dismiss these kinds of resource values without adequate consideration of benefits versus costs of all types?

### (3) *Contour Strip Mining*

Another example of lack of concern over coal recovery is in contour mining. Past practice has involved taking one to possibly three cuts on a coal seam back from the outcrop. Often in Appalachia contour stripping of a seam near the top of a knob or mountain would extend all the way around the mountain and leave unrecovered substantial amounts of coal.

Another factor is the rapidly changing technology and economics which encourages redisturbance of rehabilitated areas to allow additional strip mining which has now become feasible. It would seem preferable from both a mineral conservation and an environmental standpoint to encourage complete mining of an area in one development, and, then, rehabilitation of the area for its post-mining use.<sup>9</sup>

Contour mining is illegal in Montana because it is believed that social, economic and environmental costs outweigh benefits (Newby 1974, Wicks et al. 1973).

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<sup>8</sup>The Alberta Energy Board recently heard a similar suggestion from Geologist R.W. Johns recommending that Shell, Canada, Ltd. be required (and that it was technically feasible) to remove overburden to a depth of 150 feet over tar sands rather than Shell's proposed 93 feet.

<sup>9</sup>The National Commission on Materials Policy proposed that the Federal Government pay for the extra cost of recovery of minerals involving marginal economics to reflect the value of a one-time environmental disruption. (Engineering and Mining Journal 1973).

#### (4) *Multiple-Seam Mining*

In many places, two or more coal seams occur with relatively small thicknesses of rock between seams. In surface mining, recovery of these multiple-seams is often possible. However, many times this recovery is not accomplished.

For example, in the Colstrip, Montana area, one mine recovers a lower seam and one mine does not. The reason given for not recovering the lower seam is that it contains more sulfur than the sales contract calls for and therefore is not saleable. (Other sources indicate that the sulfur is mostly contained at the contact with the parting and can be separated in the mining process.) Therefore, in the one mine the coal in this lower seam is not recovered, rehabilitation of the area is completed, and future recovery of this resource is questionable to say the least.

#### b. *Oil Shale*

The oil shale resource is huge. Depending on the cut-off grade used, in-place resources contain shale that could be converted into trillions of barrels of shale oil (Duncan and Swanson 1965). The Piceance Creek basin deposit in western Colorado is really one continuous lens-shaped deposit 25 miles by 30 miles. The thickest part of the deposit contains up to 2000 feet or more of high grade shale under 1500 feet or less of overburden.

In parts of the basin there is a saline zone in the oil shale containing an estimated 30 billion tons of nahcolite (sodium bicarbonate) and 27 billion tons of dawsonite (sodium aluminum carbonate) intermixed with the oil shale (Prouty 1974). The dawsonite is a potential source of alumina from which aluminum could be produced, and of soda ash. The nahcolite is also a potential source of soda ash which is a raw material with numerous uses. These minerals may also be valuable in air and water pollution control. Also, oil, gas, and coal underly parts of the basin.

The recent increases in the price of crude oil apparently have changed the economics of oil shale production. The first lease sale in Colorado brought a high bid of \$210 million for a 5,089 acre tract or over \$41,000 per acre—the highest per acre bid ever received for a tract of federal mineral land.

If this tract is developed by surface mining the estimated recovery is 4 billion barrels (high-grade shale only). If mined by underground methods, recovery is estimated to be 1.8 billion barrels—less than ½ the recovery by surface methods (*Oil and Gas Journal* 1974).

Extraction of the shale oil by *in situ* (in place) methods has been suggested as the answer to environmental problems. However, most experts place *in situ* processes in the experimental stage, recovery could be quite low (30 percent or less of oil shale and none of saline minerals), and may cause other environmental problems.

The present Interior Department leasing program is just prototype leasing—to determine the feasibility of an industry and means of correcting any unacceptable environmental impacts.

Unless future leasing and mining (both underground and surface) is coordinated, the losses between mines could be huge.

Recently, several people, including Dr. Clifton Livingston (Prouty 1974) have seriously suggested considering the possibility of coordinated development of the whole Piceance Creek deposit under an overall development plan, includ-

ing the possibility of sequential surface mining of the whole deposit. Such a plan would *not* result in one huge open pit but rather in a limited area being mined at any one time with previously mined areas being used for overburden and spent shale storage followed by rehabilitation to the final land use. The development would take perhaps more than 100 years to complete.

Such a development would maximize recovery of lower grade shale where the larger reserves occur, recovery of associated sodium and aluminum values and, at least, provide a planned rehabilitation program. Without such planned development, it seems reasonable to assume that "high-grading" (present discussions center around only the shale containing 30 gallons of shale oil per ton) will occur, billions of barrels of shale oil will be lost or, at least, made more difficult to recover, and possibly associated mineral values will be lost. Also, it is conceivable that environmental impacts could be as great or greater without an overall scheme than under a planned development.<sup>10</sup>

A central organization to control major ground water problems in the Piceance Creek basin has been proposed (Knutson and Boardman 1973).

An example of the mineral values involved is an estimate made by U.S. Geological Survey that a particular one square mile (640 acres) in the Piceance Creek basin containing a core hole has shale that could yield almost one billion barrels of shale oil, 42 million tons of alumina and 80 million tons of soda ash—worth billions of dollars (U.S. Geological Survey 1967). In addition there are millions of barrels of shale oil contained in lower grade oil shale below the saline zone that was not cored.

#### *c. Trona*

Trona (sodium sequicarbonate) occurs in several nearly horizontal beds varying from 3 to 14 feet thick in the checkerboard (alternate railroad and federal sections) lands in southwestern Wyoming. Mining of two beds is done by room-and-pillar methods on about a 10-foot thickness. Recovery is presently about 50 percent of the bed being mined. It seems possible that by solution mining of the mined areas or by removing ("robbing") the pillars that recovery could be greatly increased.

## **Public Policies**

### *1. Principles*

What is proposed does not involve going to the extreme of attempting to recover the last pound of ore in a mineral deposit. Several points are involved:

- Mineral recovery aspects should be explicitly considered.
- The economic question is not one of totals, but rather one of marginals—marginal input or costs (of all types) compared to marginal output or benefits (of all types).

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<sup>10</sup>It should be noted that I am not, necessarily, advocating this approach, only advocating that it be given serious consideration, if and when further leasing is considered. Mrs. Carolyn Johnson of the Colorado Open Space Council suggests that such consideration should consider such things as lack of rehabilitation technology, limitations imposed by water supplies, the low grade of oil shale as an energy source, major loss of wildlife habitat, and that perhaps the Piceance Creek basin is a critical environmental area which should not be mined.

—Decisions regarding mineral recovery should not be based solely on individual company profitability but rather should be questions of tradeoffs involving a wide range of social, economic and environmental benefits and costs.

—As suggested by David B. Brooks, Research Director, Office of Energy Conservation, Canadian Department of Energy, Mines and Resources, the goal should be maximizing net social returns rather than maximizing recovery, per se. (Brooks 1974). I submit that in many cases this would result in increased recovery over present practice.

Therefore, it is suggested that the following principles might be appropriate, considering the existing and potential mineral resource shortages, concern for posterity, and concern for the environment:

a. Decisions regarding alternative proposed mineral developments should be based on maximizing net social returns which include consideration of social, economic and environmental benefits and costs.<sup>11</sup>

Mineral recovery aspects would be explicitly considered.<sup>12</sup>

b. Once a decision is made to proceed with development of a specific mineral deposit, mineral recovery should be a major consideration in that development.

## 2. Policies

Assuming acceptance of the principles outlined above, they could be applied in several ways:

### a. General Policies

#### (1) Federal

Implied in the principle set forth previously is some new mechanism for determining “net social returns,” which I am unable to fully consider in this paper. The Bureau of Land Management’s planning system to be discussed later could perhaps provide the basis for Federal mineral resources.

#### (2) State

State government is already involved in this problem to some extent:

##### (a) Oil and Gas Conservation

Most oil producing states have oil and gas conservation commissions or agencies, one of whose duties is concerned with recovery aspects. However, the effectiveness of these agencies can be and has been questioned (*Resources for the Future*, 1968). Perhaps changing their role to cover all mineral development would improve their effectiveness.

##### (b) New Montana Law

Senate Bill 44, enacted by the Montana Legislature in 1973 requires that all strippable coal that is economically feasible to mine and is marketable, be

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<sup>11</sup>Kathy Fletcher, presently at Rocky Mountain Center on Environment (ROMCOE) and joining the Environmental Defense Fund, suggests that the amount of energy expended in obtaining the additional recovery also be considered. William Claycomb of BLM would go even further and require a complete energy input-output analysis from mining through end use when considering alternatives.

<sup>12</sup>Montana is attempting to do this in their *Energy Policy Study* (Newby 1974).

mined before abandoning a seam. Strip mine plans are reviewed by and subject to approval of the State Land Department to determine if waste (defined as nonremoval or nonutilization of strippable and marketable coal) will occur. Proposed regulations require submission of information on overburden characteristics, coal quality, cost and revenue analysis of mining, of marketing, estimates of cost of mining, and the market value of coal not planned for extraction.

b. *Public Land Policies*

Because of known resources and projected demand, much of the future mineral development probably will take place on federal lands or on federally-owned mineral rights. Some examples of Federal resources are oil shale (about 80 percent federally owned), Western low-sulfur coal (most federally-owned), and off-shore oil and gas (Federally-owned beyond areas owned by the state).

The U.S. Department of the Interior is involved with recovery of these federally owned leasable mineral resources in at least two significant ways: (1) in the decision of when, where, and how to lease, and (2) in the supervision of the development of the mineral resources.

(1) *Leasing*

The Interior Department's Bureau of Land Management (BLM) is the agency charged with making decisions as to when, where, and how to lease. This is done with the advice of the U.S. Geological Survey.

BLM has a planning system which is used to aid in land use decisions including mineral leasing decisions. This planning system is developing and dynamic, includes consideration of social, economic, and environmental factors, and provides for full input by the public. As part of this system and Secretary of the Interior Morton's coal leasing policy, BLM is in the process of developing the Energy Minerals Allocation Recommendation System (EMARS) which will attempt to relate further demand for federal coal to future coal leasing. One of the criterion for selecting proposed leasing tracts will be that, everything else being equal, tracts allowing maximum recovery will be ranked higher than tracts where recovery would likely be low.

Other things that BLM can do relating to mineral recovery include:

- (a) Provisions in leases that encourage or require greater recovery.<sup>13</sup>
- (b) Reserving areas where recovery would be low until technology can assure adequate recovery (An acceptable form of high-grading).
- (c) Planning a leasing strategy or scheme for large deposits. In other words, develop an overall development plan which would give recovery major consideration and lease in such a way as to assure the plan is carried out.

(2) *Supervision*

The Geological Survey is responsible for the supervision of the operations under the lease, including exploration, development and abandonment. Operators must submit plans for exploration and development to USGS for review and approval. This step is normally the one where recovery aspects

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<sup>13</sup>Language to this effect has been drafted. Presumably this requirement would be reflected in lower bids when a lease sale is held.

can be considered. In addition, during operations the USGS has authority to stop or control operations involving waste.

## Conclusion

Basically the problem with how decisions regarding mineral recovery are decided at present is quite similar to many environmental problems—that is, social “costs” of “high-grading” are not internalized. It is suggested that mineral recovery aspects be explicitly considered in decisions regarding proposed mineral development and that they be considered along with other social, economic, and environmental benefits and costs under a goal of maximizing net social returns.

Specifically, I recommend that:

1. Environmentalists, conservationists and the general public be as concerned with the percent recovery in the development of minerals deposits as with the potential environmental impacts of their exploitation.

2. Public policy should be concerned with the physical loss of resources, should encourage consideration of the social costs of low recovery and not allow economics of the firm to be the only consideration in decisions regarding mineral development.

3. The Government, and particularly the Federal Government, should increase its efforts in this field<sup>14</sup>

The federal land managers, through “wise management” of public mineral deposits, should set a progressive example and demonstrate leadership on this subject.

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<sup>14</sup>Montana has already made considerable progress in this field (Newby 1974).

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## Discussion

DISCUSSION LEADER NEWBY: The relevance of this concern for conservation and mineral development is very clear to those of us who live in the states encompassing the areas where ownership of mineral estates by the Federal Government is as high as 90 percent.

MR. ROGER BARBER [University of Kentucky]: If you people in the West think you like strip mining, before you get too deeply involved, please come visit me at Lexington and let me show you the deaths of streams that result and the utter devastation of the landscape, where there is no hope of recovery within the next thousand years or so.

But, on second thought, maybe strip mining coal in the West is a fine idea because if it really gets to be the thing to do, perhaps the strippers in Appalachia will move out here where the work is easier. Then perhaps we can retain that small percentage of Kentucky that is still suitable for human habitation.

MR. MONTGOMERY: I am not sure that requires any comment but I want to say that I wasn't necessarily advocating strip mining—I was only advocating that the recovery aspects be explicitly considered in any decision regarding this matter.

MR. ROBERT HOOVER [Colorado Wildlife]: You mentioned that, in connection with your program, there would be opportunity for public input.

I learned last night, in attending a meeting on this, that the District BLM Office has to have its recommendations in to Denver by April 22nd and that we have until April 12th to respond to these recommendations. I don't believe that this gives ample time for public input. I wonder if there is a possibility of getting any extension.

I understand you are operating under a timetable established by the Secretary's Office.

MR. MONTGOMERY: Well, I am not sure that I can answer on the possibility of an extension but, generally, these areas have gone through the planning process and have been classified as suitable for leasing; or, if they have not then there is a provision that we would go through these public meetings processes and get public input before final decisions are made.

Also, there has been no decision as to specific dates when the Secretary will issue a schedule. However, I can say that before any of these decisions are made, the planning process will have either already taken place or there will be provisions for it.



MR. DICK WALSH: [Colorado State University] Why is the Interior Department rushing into additional coal leases at this time, especially when there is over a century of supply of coal already leased?

MR. MONTGOMERY: This is being considered in the decisions that might be made for leasing, and I don't think it is clear at this point there will be any leasing. We are in the process of analyzing the existing coal leases and determining whether we are committed to specific markets and also whether there might be environmental factors and other things that would prevent them from being developed.

I don't think a decision has necessarily been made that there will be further leasing.

MR. WALSH: However, why is there a need for additional coal, especially when there are billions of tons of coal already leased and not being developed?

MR. MONTGOMERY: This would be one of the things our analysis is going to tell us. It could well be that there is no need for additional coal leasing in this particular area but, on the other hand, there may be situations where there is a need for additional leasing in some other areas.

MR. WALSH: Is there going to be provision to require that firms that lease this coal are going to have to develop it, or can they sit on it for decades and keep it out of the public domain?

MR. MONTGOMERY: The answer to that question is there will be provisions in the lease that will either specifically require development or provide an economic penalty for not developing.

CHAIRMAN TOWELL: Thank you, Mr. Newby.

I want to express my appreciation to the speakers for a very fine presentation this morning and I am also appreciative to the audience. Thank you all for your attendance. We are now adjourned.



## **TECHNICAL SESSION**

### **Wednesday Morning—April 3**

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## **Achievements and Needs in Environmental Information and Education**

*Chairman*

WILLIAM J. MULLENDORE  
Public Affairs Specialist,  
Department of Natural Resources, Lansing, Michigan

*Discussion Leader:*

CHARLES J. GRIFFITH  
North Central Regional Executive,  
National Wildlife Federation, Minneapolis, Minnesota

## **Remarks of the Chairman**

William J. Mullendore

I hope that beginning here this morning the I&E Technical Session will once again become a regular annual feature of the North American Wildlife and National Resources Conference. It used to be, but in recent years they have been rather intermittent. I am prejudiced, I suppose, but I am convinced that I&E has more to offer than is presently being utilized by most resources agencies. The potential for more effective, more imaginative programs exist in every I&E staff that I know about.

In Michigan, and I think nationally, I&E is in a transitional phase, moving from approaches based on conventional techniques which have worked reasonably well in the past but don't seem to be getting the job done today. We confront an increasingly skeptical, even hostile and certainly much more sophisticated public that is less and less willing to accept our message simply on our say-so. Some of what we have done in the past is definitely boomeranging back on us.

On the information side, the old ways just aren't producing the results we want any more. Traditionally, we have put almost all of our eggs in the mass-media basket to do a selling job for our agency programs. We produce news releases, magazines, photos, films, radio programs, TV shows and have done these things in a way that any communications professional would describe as being technically excellent. We have gone the mass-media route because it was the cheapest way to go, the least costly method of reaching the

most people with the fewest dollars, and dollars seem always to be short in I&E programs.

Now we find ourselves in the unhappy position that what we are cranking out in the mass media just isn't being bought by the public because the credibility of the media has sunk right along with the credibility of our government and educational institutions. I don't mean to imply that those two declines are related, but the fact of the matter is that the surveys show the majority of the citizenry no longer believes what it reads, hears or sees in the mass media; and this certainly poses a problem for people in resources agency information work.

On the education side, our excellent technical efforts appear to have produced a generation of preservationists. Most of the anti-hunting, anti-cutting, anti-management of any kind, other than leave-it-alone sentiment, is coming from young people. This, again, is confirmed by surveys. Reluctant as I am to admit it, before this audience anyway, we apparently have another, even stronger-minded generation of preservationists coming along: that is, if my own two kids are any criteria. If my two university student daughters had their way, Pop would hang up his guns and his fishing tackle, and he probably would even quit hunting mushrooms and wild berries. They didn't learn those ideas at home, I assure you.

Obviously, we must have some new approaches in information and education. Although the title of this session gives equal emphasis to both achievements and needs, the stress will be on needs because we have some real serious problems in I&E, and our speakers this morning are going to point some directions for attacking them.

# New Role for Government Information And Education Personnel<sup>1</sup>

M. Rupert Cutler

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Human behavior is not impossible to predict. Every man is entitled to his day in court; therefore, natural resources agency administrators should not be surprised when they have to defend their decisions regarding the use of publicly owned resources before a judge. Litigation may be kept to a minimum by increasing the number of opportunities for public involvement in agency decision-making. Public inputs are essential in determining what programs and projects currently are "in the public interest" as well as useful in minimizing litigation. Hearings and other forms of two-way communication constitute provision of administrative remedies, or administrative alternatives to litigation. Arranging for and encouraging a stepped-up level of public involvement in agency decision-making is the new role I urge government information and education personnel to play.

In this paper I shall (1) describe the legal principles and recent developments in case law which make it possible for agency administrators to be taken to court by dissatisfied citizens' groups; (2) attempt to prove that more public involvement will result in less litigation by summarizing the results of my study of four lawsuits involving the United States Forest Service; and (3) suggest a specific new program for information-education personnel designed to reduce chances that their agencies' programs will be delayed by litigation, and also designed to establish an important agency defense, should litigation alleging absence of due process be initiated.

Because my study involved federal agencies and the federal court system, not state agencies and state courts, state agency personnel may want to explore with their state attorneys general the applicability of these findings in their states. In Michigan the findings are relevant because of a 1970 statute, called the Michigan Environmental Protection Act,<sup>2</sup> which practically guarantees access to state courts for plaintiffs who can make a *prima facie* showing of environmental damage.

## Legal Principles and Recent Developments

Our courts are reluctant to change the rules under which they operate. Under the rule of *stare decisis*, they are guided by precedent. Decisions made in

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<sup>1</sup>This study was conducted with supplemental financing from the Forest Service, U.S.D.A., and the National Wildlife Federation. The final report is on file under access number 4820-FS-NC-4201 (9) (January 15, 1973) at the North Central Forest Experiment Station, Folwell Avenue, St. Paul, Minnesota 55101 and may be ordered from University Microfilms, Ann Arbor, Michigan 48106 as: M. Rupert Cutler, "Study of Litigation Related to Management of Forest Service Administered Lands and Its Effect on Policy Decisions" (Ph.D. thesis, Michigan State University, 1972).

<sup>2</sup>Public Act 127 (1970).

years gone by are used to decide similar cases today. Appellate courts do break new ground occasionally, however, permitting the law to evolve in response to changing societal values and goals. One such departure from precedent occurred in the civil rights field in 1954, when the Supreme Court made its historic *Brown v. Board of Education*<sup>3</sup> school segregation decision. The 1965 revision of the law of standing by the Federal Court of Appeals for the Second Circuit in *Scenic Hudson Preservation Conference v. Federal Power Commission*<sup>4</sup> was a breakthrough on the environmental quality front. In this case an *ad hoc* conservation group was given access to the courts to challenge the FPC's decision to allow construction of a hydroelectric project on Storm King Mountain on the Hudson Highlands. Prior to *Scenic Hudson*, conservation organizations which had tried to gain access to the courts to attack government decisions were told that, because they could not show individualized, economic injury, they lacked standing as proper parties. *Scenic Hudson* expanded the "aggrieved parties" class to include "those who by their activities and conduct have exhibited a special interest in . . . the aesthetic, conservational, and recreational aspects" of federal agency-approved or conducted projects. Seven years later, in *Sierra Club v. Morton*<sup>5</sup>, the Supreme Court laid down clear guidelines on the question of the standing of conservation groups as plaintiffs. The basic requirement now is that the party seeking judicial review must show that he himself has suffered or will suffer injury, economic, recreational or otherwise. This should be relatively easy for a conservation group to allege, if the organization or any of its members can show they have used the area in controversy in the past.

Environmental groups are not only *in* the courtroom now, they have *successfully* sued the United States Government and stopped agencies "in their tracks." Neither the Justice Department's claim that these groups have no standing, nor its argument that the Federal Government has not consented to be sued and therefore is protected by sovereign immunity, have impressed federal judges in recent cases. All a plaintiff must allege to overcome the sovereign immunity defense is that individual federal officers have abused their discretion by acting arbitrarily or capriciously, or that they have acted beyond their statutory authority.

Conservation group plaintiffs must demonstrate to the court that they have exhausted their administrative remedies—done everything legally possible short of filing suit, such as testifying at administrative hearings, if there were any, and taking their case through an administrative appeal procedure, if one was available. Their suits must conform to traditional legal approaches, by establishing that the court has jurisdiction over the defendants, that the court's location is the proper place for the trial, that the plaintiff has standing to maintain the action, and that the defendant's actions are reviewable by the court. A breach of duty must be alleged. And the burden of proof is the traditional one: They must go forward with their evidence, and they must establish their case by a preponderance of the evidence.

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<sup>3</sup>347 U.S. 483 (1954).

<sup>4</sup>354 F.2d 608 (2nd Cir. 1965), *cert. denied*, 384 U.S. 941 (1966).

<sup>5</sup>405 U.S. 727 (1972).

Two final legal concepts of which both potential plaintiffs and defendants should be aware: (1) The complaint must be filed in time—that is, before major construction contracts have been issued and earth or vegetative changes already are underway—or the plaintiff may be deemed guilty of *laches* and his case will be dismissed; and (2) the plaintiff, while entitled to his day in court, is entitled to only one day in court. The doctrine of *res judicata*—“a cause of action once finally determined between parties by a competent tribunal cannot afterwards be litigated between parties in a new proceeding”<sup>6</sup>—says that it has only one shot and that it had better make that one count. Agencies, therefore, are protected from continuing harassment through litigation on the same program or project.

### **A Summary of Four Recent Cases**

In 1970 I visited the sites of four national forest management controversies which had erupted into lawsuits to interview key participants and obtain transaction evidence connected with these four cases. One purpose was to see if, as some Forest Service personnel believed, these cases represented independent efforts of “misguided local groups of wilderness preservation extremists,” unrelated either to each other or to any system-wide Forest Service problem, or if, as others within the agency suspected, they were similar in many respects. I found, in all four cases, dissatisfaction with the agency’s internal decision-making, with its public involvement procedures, and with existing administrative remedies. The data show convincingly that, while the legal bases for the suits differed, they were linked by a common thread of “exhaustion and frustration” on the part of the plaintiffs with the agency’s public involvement procedures.

#### *Differences*

In *Gandt v. Hardin*<sup>7</sup> a Green Bay dentist and his small, *ad hoc* Save Our Sylvania Action Committee sought unsuccessfully to have the Ottawa National Forest’s management plan for the Sylvania Recreation Area in Michigan’s Upper Peninsula declared in violation of the Multiple Use Act’s mandate that “due consideration be given to the relative values of the various resources in particular areas.” Dr. Gandt saw the management plan, which provided for road construction, timber sales and other development in an unusually extensive tract of old-growth northern hardwood forest, as a breach of the purpose for which the former private estate recently had been purchased by the Federal Government—namely, as he understood it, to protect the area’s wilderness characteristics—but his lawyers could not prove abuse of discretion.

In *Parker v. United States*,<sup>8</sup> several parties plaintiff, including the Sierra Club and the Town of Vail, Colorado, sought to stop a White River National Forest

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<sup>6</sup>“Res judicata,” *Words and Phrases* (St. Paul: West Publishing Co, 1950), p. 613.

<sup>7</sup> Civil Action No. 1334, U.S. District Court for the Western District of Michigan, Northern Division, December 11, 1969, unreported.

<sup>8</sup> 307 F. Supp. 685 (1969), 309 F. Supp. 593 (1970), 448 F. 2d 793 (1971), *cert. denied* 92 S. Ct. 1252 (1972).

timber sale within a roadless area proposed by citizens' groups for inclusion in the Eagles Nest Wilderness. The decision, upheld on appeal, went against the Forest Service. The courts advised the agency that it had a duty under the Wilderness Act to identify all areas on the periphery of all Primitive Areas which qualified as wilderness under the Act's definition and to withhold these areas from development pending Congressional establishment of new Wilderness boundaries. The courts agreed with the plaintiffs that the Forest Service was about to breach its duty under the Wilderness Act by proceeding with the East Meadow Creek timber sale. Therefore, the sale was enjoined until Congress acted on the matter.

In the case of *Sierra Club v. Hickel*,<sup>9</sup> a number of "legal technicalities" were used by the Sierra Club in its battle to prevent or delay construction of a thirty-million-dollar ski and golf resort in 8,000-foot-high Mineral King Valley in California. The Club hopes the valley will be transferred by Congress from Sequoia National Forest to Sequoia National Park and that the resort development either will be cancelled or sharply reduced in size and environmental impact. The federal district court has agreed with the Club that the Forest Service practice of combining term and terminable special use permits to grant ski resort permittees the use of more than eighty acres of National Forest land constitutes illegal circumvention of the Term Permit Act of March 4, 1915, as amended, but a final ruling on the merits of this case has yet to be handed down.

In *Izaak Walton League of America v. St. Clair*,<sup>10</sup> the League was successful at the federal district court level in its attempt to win a judicial interpretation of the Wilderness Act as a zoning statute which permits only uses compatible with wilderness preservation in the Boundary Waters Canoe Area in Minnesota's Superior National Forest. The district court decision held that core drilling for mineral exploration within the BWCA could not proceed, even though the mineral rights where drilling was proposed were privately held, because such drilling would destroy the area's wilderness qualities.

### *Similarities*

Of more significance and interest than the differences are the many similarities that were found among the four cases studied. The organizational plaintiffs had much in common, and so did the individual plaintiffs. The individuals were sportsmen and backpackers who used and enjoyed wilderness areas and who had no formal training in natural resources management. The organizations filed suit primarily to protect natural landscapes, but also to enhance their own images as effective forces for conservation.

All the plaintiffs had asked the Forest Service repeatedly to change its plans or postpone their implementation pending public hearings and further study. All of these requests were denied. *No Forest Service hearings were held in any of these controversies*, apparently because hearings were not required by law. (The

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<sup>9</sup>Civil Action No. 51464, U.S. District Court for the Northern District of California, July 23, 1969, unreported, 433 F.2d 24 (1970), *sub nom*, *Sierra Club v. Morton*, 92 S. Ct. 1361 (1972).

<sup>10</sup>313 F. Supp. 1312 (1970), 353 F. Supp. 698 (1973).



National Environmental Policy Act, with its consideration-of-alternatives and environmental impact statement requirements, had not been signed into law when these lawsuits were initiated.) In all four cases, litigation was begun as a last resort, to stop major actions with long-lasting impact on the environment. Legislative action to protect the threatened environment was seen as the ultimate objective, with the courts' injunctive relief serving to provide additional time in which to lobby.

Present in all four cases was a failure to communicate. The Forest Service gave regional audiences in the Midwest the impression that it was buying the Sylvania tract to save it as a wilderness area, while confiding to local audiences and to the Congress that it had timber sales and massive development in mind for the tract. Ultimately, a misunderstanding between the principal plaintiff and the forest supervisor over the location and timing of road construction—the result of an oral exchange drowned out by the noise of aircraft engines—led to the filing of the suit. A special committee of the Colorado Open Space Coordinating Council (an umbrella group including the state chapter of the Sierra Club and many other groups including the Colorado Wildlife Federation) established solely to communicate with the Forest Service's Denver Regional Office was not consulted by the agency regarding its timber sale plans, as its conservation group members had hoped it would be. Sierra Club Executive Director Michael McCloskey's expressions of concern regarding the environmental impact of the resort plan for Mineral King were met with profound disinterest at the agency's San Francisco Regional Office.

These private citizens felt ignored by officialdom, dwarfed by a huge, monolithic agency, and unable to resolve their conflicts with the agency through any means other than an impartial court of law.

### **Public Involvement a New “I And E” Responsibility**

Is public involvement in agency decision-making needed, or is the current talk about citizen advisory committees, listening sessions, and fishbowl planning a passing fad? One might as well ask if governmental agencies are to be administered to serve the best interests of the public. If they are, it follows that meaningful involvement of the public in agency decision-making is essential, for, as Professor Charles A. Reich observed a decade ago in his paper, *Bureaucracy and the Forests*,

... it can be argued that in a democracy the “public interest” has no objective meaning except insofar as the people have defined it; the question cannot be what is “best” for the people, but what the people, *adequately informed*, decide they want. Professional forest and recreation managers, no matter how dedicated, are not necessarily qualified to engage in this form of planning on their own.<sup>11</sup>

Professor Reich arrives at this conclusion after observing that,

... in large measure, the power to create fundamental policy for the publicly owned forests has fallen to small professional groups. They make

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<sup>11</sup>Charles A. Reich, *Bureaucracy and the Forests* (Santa Barbara, Calif.: Center for the Study of Democratic Institutions, 1962), pp. 9-10, emphasis added.

bitterly controversial decisions, choices between basic values, with little or no outside check.<sup>12</sup>

Since those words were written the situation has changed somewhat because the kind of litigation just described has resulted in new agency guidelines encouraging more public meetings and hearings, and because the “disclosure” provisions of the Freedom of Information Act, national and state environmental policy acts, and other special-purpose laws and executive orders have resulted in *Federal Register* announcements, draft environmental impact statements, and other steps toward more open government.

### *Procedural Suggestions*

These are my procedural suggestions to reduce agency-interest group friction. Let’s look first at the phenomenon of public hearings. Resource agencies’ hearings would be more useful, both to the public and to the agency, if conducted by a person independent of the proposing function in the agency, and if this independent hearing officer were allowed to make his own report on the merits, for the information of those empowered to reach a final decision. Interest group members also would like to see hearings held early in the planning process in convenient, neutral locations, after at least thirty days advance notice and adequate publicity. They should be conducted in a relatively unhurried manner, with reporters on hand to make verbatim transcripts of the proceedings. The product of these hearings, in addition to the transcript and tallies of proponents and opponents, should be reports to the decision makers on the merits of the issues. These reports should be based on a sifting of the worthwhile contributions of fact and philosophy from the rhetoric—much as a judge sifts the evidence—and should suggest an equitable decision or set of alternative decisions supported by reasons, much as they are offered in a court’s opinion.

All of the traditional public involvement procedures should be considered open for continued refinement. One important and needed change in procedures is to give citizens’ groups more lead time to make their own studies and arrive at their own policy conclusions, which in some instances may take months of resolution-debating in local, district, regional, state, and national conventions. Projects *scheduled* years in advance could well be *publicized* years in advance. Agency staff members not only should schedule and participate as listeners in so-called “listening sessions,” but also may have to play the role of mobilizers of citizen input in the absence, hopefully temporary, of citizen leadership. Advisory committees ought to be free of agency domination; the “experts” should be on tap, not on top.

Models of existing public involvement procedures, with flowcharts pinpointing various opportunities for public input at different stages in the decision-making process, are worthy of development to better understand and perfect the process.

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<sup>12</sup>*Ibid.*, p. 2.

### *Divisions of Public Involvement*

Resource management agencies' divisions of information and education could be renamed *divisions of public involvement* and given new missions, with the broader mandate implied in the new title. Representatives of this re-oriented unit could then be made responsible for coordinating citizen input in the early stages of the development of a plan or in the early stages of a controversy, and bringing this input to the decision-makers' attention, as an ombudsman might. Early resolution of potential conflicts through the mediation efforts of public involvement specialists stationed in district and regional offices might stem the trend which is reducing the discretion of field personnel. The communications and community relations specialists required to staff such a new unit would be an added expense to the agency, but one which the conservation organizations would see as worthy of their political and financial support. Perhaps some I and E staffers could be relieved of traditional press relations and publications roles—by turning over responsibility for conservation education programs to the state department of education, for example—and reassigned to the challenging job of going out among the clientele groups and encouraging them to be explicit with respect to their public program desires.

It is a good sign that more people are becoming interested in the quality of the environment and are becoming more effective in expressing their interest in natural resources management policy. Involved citizens are potential political supporters of agency programs. More importantly, involved citizens are assuming a personal responsibility for renewing and preserving our environmental heritage. In the process, they are restoring and strengthening the faith of individuals in the processes of government.

Decision-making in a democratic society is not easy, and new procedures will not make them more so. As Professor Reich concluded:

Procedural reforms cannot be expected to solve the dilemma of how planning for the public good can be accomplished in a democracy. Professional planners and managers cannot be dispensed with. But some means of public participation, however inadequate, would at least offer the beginning of a system of planning that would encompass a broader vision and a deeper relation to democratic ideals.<sup>13</sup>

Our agency decision-makers, aware that litigation and political hot water await them if they are not responsive to the public's desires, need help interpreting what the people want. Information and education personnel traditionally have tried to mold public wants to coincide with the agency's wants—to impose professional biologists' or foresters' values on the public. I am not arguing that the transmission of scientific research and management findings and recommendations to the general public in easily understood form should cease or that natural resources policy should henceforth be set by a consensus of "barber shop biologists." I am suggesting that professional resource management recommendations be offered to the public by public involvement specialists in the form of several practical alternatives in every

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<sup>13</sup>*Ibid.*, p. 13.

instance, with the social, economic and environmental impacts of each alternative made clear. Then let the public, “adequately informed,” decide what it wants for its money.

## Discussion

DISCUSSION LEADER GRIFFITH: I would like to ask should the I&E man think of himself as an advocate of the public interest as well as a representative of the particular agency that he works for? And is this sort of a Jekyll and Hyde role really possible for the I&E man?

DR. CUTLER: That is a question I have to face myself as one who worked as an advocate for about fifteen years and then took a job with the Cooperative Extension Service which is supposed to be a neutral purveyor of alternatives.

The thrust of what I have in mind is the role played by an ombudsman who, while able to do an adequate job of explaining the agency's findings, its problems, its needs—the realities of the situation from a biological and economic standpoint—is still able to be good enough of a listener—enough of a P.R. man in the sense that he encourages input from the public to stimulate as much and as diverse an amount of public input as possible—to provide the agency decision-maker with additional information which hopefully will result in better decisions. It is a Jekyll and Hyde role, I suppose. In other words, you make your pitch. Hopefully, you will pitch two or three alternatives and listen to the feedback.

MR. JAY CRAVENS [Regional Forester, Eastern Region]: I don't think the comments you made are heresy; they are good, sound suggestions. I think we have overdone some of the traditional approaches.

One of the problems that we have is getting the finances and the allocations of ceilings on positions for people who are involved in these activities. I would like any suggestions as to how we might approach this. This is going to take grass roots support because we have been cut down continually on the number of people that have been assigned to these activities since the entire government got caught in the backlash with *The Selling of the Pentagon*. There has been a continual attrition of the I&E people. Perhaps this office of public involvement might offer a new challenging opportunity. Do you have any comments on that?

DR. CUTLER: This reminds me of the problem that the Department of the Interior and the BLM find themselves in when Congress decides that they have been too effective from the public relations standpoint and chops a line item out of the budget and so you see public information people showing up under strange new titles in the state offices as Assistant to the Director or something of this sort.

It also reminds me of the experience in Washington, which I think has been a good experience, involving the coalition of interest groups that, for the most part, are not united—forest products industry, environmental groups, preservation groups, and so forth—that, it seems to me, every couple of years have been able to get together and testify before appropriations committees of the Congress on behalf of the basic funding needs of the Forest Service. And this could be another one on their agenda.

I think that this is the kind of program that all of the national interest groups could support, and it is the sort of thing that should come to the attention of the Natural Resources Council of America as a recommended priority legislative goal in the appropriations process. I hope that the national interest groups move in that direction.

MR. MERRILL PETOSKEY [Michigan, DNR]: What do you do when something happens like what happened on the commercial fishing areas in Michigan where you go the entire route as our Department did and then have the complete process eliminated by legislative motion?

DR. CUTLER: I know what you are talking about, Pete and it is a tragedy when things like this happen. I think we have heard both from our Representatives in the Congress and from our own state legislators that the environmental interest groups have got to get

it back together. We seem to have rested on the oars since the successes of 1968, 1969 and 1970, and it only points up the necessity of more effective work in our state and national legislatures.

One of the unsaid things in my paper, one of the things implicit in it, is when the folks in the agencies give the interest groups opportunities to participate in this process, the interest groups have a responsibility for doing a good job of participating. This has been an embarrassment from time to time when the hearings have been scheduled and nobody comes. So the burden is on the interest groups equally to provide enough worthwhile input to make this whole exercise meaningful.

In the case of this commercial fishing situation, I guess it's just the failure of our Michigan interest groups to zero in on that issue well enough with the legislature.

# How to Get the Most Effective Use From Your I & E Staff

James F. Keefe

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In Missouri we grappled with the problem of getting the most effective use of our Information & Education Division back in 1958, and we came up with what we think is the best possible solution: Do away with it!

I notice an ear cocked here and there and disbelieving looks. Well, what I said isn't literally true—what we did was divorce I from E, thus doing away with an I & E *Division*. We think that, on the whole, it has worked out rather well.

While it is the usual pattern in fish and game agencies over the country to organize an I & E Division, I have found that Old Debbil semantics comes between me and a full understanding of what other states call "information" and "education." Some states' education set-ups are properly public relations. Their information set-ups may be what we in Missouri call education.

In Missouri—prior to the reorganization—we were organized like this: We had an *information* section and an *education* section within what we called the I & E Division. Information's job was to work with mass media of public communication: newspapers, radio, television, motion and still photography, printed matter in the form of leaflets, bulletins and magazines. Our *education* section had as its mission the influencing of youngsters in organized educational set-ups, especially school systems, but also other organized efforts like 4-H, FFA, Scouts and summer camps. Education's efforts were more narrowly channeled—rifled, if you like; while information's were shotgunned.

Missouri has always operated on the basic premise that to have a successful program of fish and game management you have to have an informed public to back you up. There have been informational material projects in the Show me State since the mid-1920's, and the present Missouri *Conservationist* dates from almost the present Commission's beginnings in 1938. The motion picture program began at about the same time, and regular press releases have always been an informational "fixture." Radio programming was begun in the early 50's, but we have not gone too deeply into television work, chiefly because we've been so successful in our other, less expensive media.

Missouri has believed in education for the long haul, too, and had a good program of getting conservation education into schools as quickly as possible after the present Commission was organized. I believe that Missouri's staff of information and education personnel of over 35 people was for many years the nation's largest and certainly most active.

So we believe in these things. There is no use debating the relative "necessity" of the various divisions that make up a fish and game department. Some of my colleagues argue that the education-information set-ups should be paramount. This is a little fatuous, like saying we can get along with a head, but the body or arm isn't necessary. Well, I believe the body of an organization like ours is the fish and game division. The arm is the protection or law enforcement staff, the

head the administrative staff, and at least the eyes, ears and mouth, is the education-information staff. But, just as the head and arms are strictly from nowhere without a body, so an I & E man is whistling in the dark when he says that HIS function is all-important.

To pursue that analogy above a bit further, a body without its head and arms is just a blob. So it needs those members too. And I & E IS important—but no more so than any of the other service functions of a fish and game agency—its administration, its protection staff, and above all its fiscal staff, from whence the paychecks flow.

Agreeing that I & E are important tools in getting fish and game management across (and, incidentally, in perpetuating our programs and ourselves), it's a good idea to critically examine those two public contact functions. We did that in 1957 and 1958 in Missouri and concluded that we'd been wrong in our organizational set-up. Maybe it's a bit strong to say we were wrong all those years, but certainly such a set-up was wrong for us in this day and age.

We felt that the two groups had objectives that were poles apart. Sort of like taking a rifle to shoot skeet, or a shotgun to a pistol match. Actually, there is no good reason why information should be tied to education in our thinking and good reason why it should not be.

Primarily, information is a staff function. Its job is to work closely with all divisions and with the administration in working out a program and then selling it to the public. It is central, and should be, and its objectives are usually shorter-range. Education is NOT a staff function but a field activity (at least as practiced in Missouri) and why should it not be closely coordinated with other field activities? Here, I might digress to call attention to our organizational set-up, where we have a director's staff, including assistant directors, information officer, personnel, fiscal, operations and planning officers, a chief-engineer, sub-office managers and staff specialists. We have a field activities division composed of protection staff, field service agents (which roughly correspond to extension service or "applied game managers") and an educational staff. We have fish and game divisions, each with research, management and public area, and special program sections. Missouri also has a forestry division, which few other fish and game agencies have so closely allied.

Thus, with this breakdown in functions, it seemed logical that more efficient use could be made of education if it were a field function and more efficient use could be made of information if it were divorced from education and made an administrative arm.

Under the old organization of an I & E division, we found a certain amount of friction resulting from an inability of one group to understand or appreciate the other. Information men were considered radical, sloppy, impatient and possibly dangerous by some education people. On the other hand, information people felt that educational staffers were hidebound, stodgy, unimaginative and unnecessarily restrictive. Put that set of viewpoints into one division, then watch the division chief slowly go insane. Those opposing viewpoints are not bad things to have, though. A good information man *ought* to think in terms of the big picture and the moment. A good education man *ought* to be playing a close game for the long haul. But in Missouri we thought it could be done best if the two groups weren't sitting on each other's necks. We think things have worked out well, thus far.

Inevitably, under a divisional set-up the chief is going to be personally biased one way or the other. As an information man, I have always thought it unfortunate that too many departments had I & E chiefs who were from the educational side of the camp. This cramps the imaginative flights of information men, and results in stodgy programs. But an education man might justifiably curse the I & E chief who is an ex-newshawk. He feels he is a little lost lamb in a situation like that.

Splitting I from E is the best way I can think of to obviate the problem of philosophical differences between education and information.

Now, I'll drop education from my discussion and get down to cases on getting more out of your information staff. First of all get them onto staff status, where they are kept abreast of every activity of the department. A good man has to know what NOT to release as well as WHAT to release. Staff status will keep him well informed. Also, if you are wise, you will have your information men in on program planning. If he has to sell a program he is entitled to a voice in its shaping. As an expert in his field he can counsel you and the rest of the staff in what will sell and what won't.

Assuming you already have information men, pay enough to keep them. Missouri has looked for information men and good ones are hard to find, harder to keep. If you want a good program, though, you must have good, dedicated men, and to get and keep them you're going to have to pay. Be sure you have a big enough staff to do the job expected of them.

When you have to secure an information man don't get fooled by the old argument that a biologist can do the job as well as the next guy, especially if he has published an article or two in the department magazine. Information and publicity is a special craft, like game management, and few indeed are the men, able to make the grade in a crossover. I have biological degrees myself, but I got them AFTER I had been a newspaperman and writer, and while writers can learn enough biology to report it intelligently, few biologists have the certain knack that makes good publicists.

Once you've got a good staff see that they get to AACI meetings regularly (and go yourself occasionally) and see that they also get a chance to take occasional short-courses and attend conventions in the printing and publicity fields. Ours is a rapidly expanding field—this public relations business—and one that needs as much attention and study as a doctor needs to keep abreast of wonder drugs. Let your information men grow professionally—all of them.

Always remember, in your dealings with information people, that they belong to a creative bunch and some of their ideas may sound a little screwball to you as an administrator. The final decisions must be yours, of course, but don't discourage some "way out" thinking on the part of your staff. Don't kill the goose that lays the golden eggs. Gently tame down their wilder ideas and possibly you'll find that they can come up with some real nuggets occasionally. In Missouri we call it thinking outside the nine dots, by which we mean that crazy ideas have a way of becoming tomorrow's SOP. It's always easier to tame down wild ideas than to think up new ideas, so use your idea men and don't kill that creative urge.

Let me further suggest that you give your information staff your confidence and some money to work with. It doesn't really take a tremendous budget to get good informational programs swinging, but it can't be done for a pittance,



either. If they need money to increase magazine circulation, give it to them. They'll reach a wider audience. If they sincerely believe they can do you a better job, give them your confidence and a light hand on the rein. Creativity never works well in an atmosphere of distrust and nickel nursing. To sum up, here are eight points that I believe will help you get the most effective use of your I & E staff (with emphasis on the I):

1. Separate information from education for a clearer delineation of purposes and programming.
2. Put your information chief on staff status, with rank equal to your other top lieutenants, with power to work across division lines, and a voice in shaping policies and programs.
3. Hire good specialists in the communications field and hire enough to do the job expected of them.
4. Pay them well enough to keep them.
5. Give them your trust and encouragement.
6. Especially encourage their creativity—the goose that lays the golden eggs.
7. See that they all get on-the-job training by meetings with other communications specialists and short courses.
8. Give them enough budget to work with.

And as a possible ninth item: get used to the fact (in your own thinking) that information work is going to become increasingly important to over-all fish and game management, as populations grow and opportunities become less.

## Discussion

DISCUSSION LEADER GRIFFITH: You indicated, Jim, that your information staff in Missouri is concentrated totally in your Jefferson City State Headquarters Office, but that you education staff is almost totally decentralized. Who then in your education staff pulls things together, points the direction or issues the marching orders?

MR. KEEFE: Well, of course, ultimately all of our marching orders come from the Commissioners, through the Director, and so forth. But we have a Chief of Education and he has about twelve to fifteen men scattered in regions over the state who work with school systems, state teachers colleges, and this sort of thing; and he primarily directs their efforts and keeps them all pulling together in some sort of concentrated program.

MS. VEE WILLET [Sierra Club]: I am here with the Sierra Club, but I work in a government publications office. I wonder where the gentleman would put publications of that kind. We also have a current information staff. But a lot of our publications are short. They are, for instance, for information. We also have a separate education staff. Would you put publications under information or education?

MR. KEEFE: Because of the close tie-up with our conservation magazine, for which information is responsible, we are also responsible for printing what we call *The Wildlife Code*, the book of laws that governs sportsmen's activities. We also publish educational material. We do this for the Education Section. The publications are all handled through information. We do, for instance, technical bulletins for Fish and Game and Forestry Divisions. All we do is edit and shepherd the thing through the printing process. They write them and we just try to shape them up a little bit and make them pretty.

DISCUSSION LEADER GRIFFITH: How do your budgets compare for Information and Education?

MR. KEEFE: I can't give you the exact figures, but I imagine Information's is about three times what Education's is, because Education's budget is primarily for personnel and travel and this sort of thing, whereas we have a considerable operations expense in Information in publications, television work, this sort of thing.

MR. PETOSKEY [Michigan]: How much is it?

MR. KEEFE: Information's? I don't know about Education's. I have a request in, with fingers crossed, for \$608,000 for 1975 for Information.

CHAIRMAN MULLENDORE: Thanks again, Chuck, and thank you, Jim, for presenting what I am sure to most of us in the I&E field is a rather shocking idea—this business of divorcing I from E. But it certainly has worked well in Missouri. I might say that the Missouri Information effort is generally considered by people in the Information field to be at least as good as any in the country and possibly the best.

# Continuing Education Needs of Wildlife and Fisheries Managers

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Historically, the interests of natural resource managers have been largely confined to the technicalities of their specialties. Foresters, range managers, park specialists, and soil and water conservationists have in the past concerned themselves largely with problems related to their own operations on the lands charged to their responsibility. Wildlife and fisheries managers have been involved for the most part in the technical preoccupations of their day-to-day work. Yet behind these routine operations there has been, on the part of these personnel, a long and well-established tradition to view their work in larger terms—a tradition which in recent decades has gradually acquired a significant place in the national consciousness.

As long ago as the 1940's, William Vogt (1948) and Fairfield Osborne (1948, 1953) were warning the public on matters of population and ecology. And with the publication in 1962 of Rachel Carson's distinguished best-seller, *Silent Spring* (Carson 1962) the situation reached a head. There is little doubt that Miss Carson has had the most far-reaching impact on society of any biologist since Darwin. More than any other single individual she started the environmental quality movement.

Today it is clear that natural resource managers are eager to play a role distinctly different from that played by their predecessors of a generation ago. Not only do they want a broader and more far-reaching preparation for their life work, but they are convinced that continuing education must be a routine part of their lives. Natural resource managers clearly want a better understanding of how their specialties relate to the large scale environmental and ecological issues that confront man in the modern technological world. Because they are aware of the rapidity of technological changes and of the complexity of environmental problems, they want not only to be brought up to date but to be kept up to date.

Resource managers want, as a regular part of their employment, systematic and extensive training in such areas as regional, community, and urban planning. They want more and fuller knowledge of the relationships of resource management to the aims and goals of the social scientist and the political decision-maker. They are eager for a better understanding of modern management-science techniques—computer applications, statistical methods, systems analysis, etc.—at least to an extent that will enable them to communicate effectively with other professionals and aid in the decision-making affecting large-scale environmental problems.

These, at least, are the conclusions that can be drawn from a study of the attitudes of natural resource personnel which was carried out by the Department of Planning Studies in Continuing Education at The Pennsylvania State

University. Based on a nationwide survey of 11,875 professionals in the National Register of Scientific and Technical Personnel and the response of some 5,600 natural resource managers and scientists, the study indicated that these professionals are seriously concerned about the problem of keeping abreast of current developments, and want better means of updating their knowledge and skills than their employers are presently providing.

The study recommends that employers of practicing natural resource personnel, in cooperation with colleges and professional societies, should step up the attention being paid to continuing education and professional training. The quality and extent of current updating programs should be reassessed, the study suggests, and work loads should be adjusted so that perhaps as much as twenty percent of the professional's time can be devoted to regular and systematic updating.

### *The Need for Professional Updating*

This is not surprising. A quick look at the general professional scene supplies plenty of evidence that updating of skills and knowledge is rapidly becoming a regular and essential part of the professional's life. In the field of medicine, for example, a number of state societies have started to require their members to take as much as sixty hours of continuing education per year as positive evidence of keeping in touch with new developments. To satisfy these requirements, many physicians now spend a substantial part of their time in organized refresher courses; others make individual use of the specially prepared cassettes and tapes on medical subjects that are rapidly becoming available throughout the country. Engineers and other groups are studying the causes of professional obsolescence and trying to determine better ways of keeping their members abreast of new skills and changing techniques. Some of these professions are requiring recertification every five years.

Not only is new knowledge being developed at an amazing rate in all professional fields, but new methods and procedures for putting such knowledge to use are changing rapidly. And since most scientific areas are becoming increasingly interdisciplinary, knowledge in fields formerly considered outside the range of a particular discipline has in many cases become an essential part of the professional's art.

### *The Changing Role of Natural Resource Managers*

For example, older methods of protecting fish and wildlife by limiting the number, size, and sex to be taken are sometimes being reversed, giving way to more diversified practices dependent on a better understanding of specific ecological conditions. The use of fire as a habitat management tool, the increasing dependence on biometrics, and other changes in technique are opening up new opportunities and providing new challenges for wildlife personnel.

But what is of even greater importance is the changing role of the natural resource manager. The need for more effective and coordinated pollution control, for example, has demanded a more widespread understanding of ecology and conservation. The increasing year-round use of state and national forests for camping, back-packing, skiing, snowmobiling, and other recreational

activities, has aroused a new and growing interest in the forests. The professional natural resource manager frequently finds himself in the center of many new, sometimes explosive, issues and debates. Not only must he be thoroughly familiar with changing technical procedures and management practices, but as he grows in his professional career, he increasingly deals with social forces. Thus, he must be equally aware of new public attitudes, community interests, and the political pressures of the increasingly militant urbanites. It is for these reasons that the "half-life" of the natural resource manager may today be as little as four to eight years.

### *The Penn State Study*

The Penn State study made use of a comprehensive survey, designed to give natural resource personnel an opportunity to supply as much information as possible on their updating needs. In addition to providing data on their professional characteristics, education, primary responsibilities, employment, and so on, they were asked to give information regarding their attitudes toward the need for updating, the factors that motivate them to keep abreast of new developments, the methods they use and the methods they prefer for keeping up to date, and the attitudes and practices of their organizations in this respect. They were provided with a list of some fifty areas of knowledge and asked to indicate the degree of their personal needs in each area, as well as to indicate whether they felt such knowledge was needed by their subordinates and by their immediate supervisors. In addition, each respondent was given the opportunity to write-in the specific courses he would like to include in a personal self-development program. Finally, he was asked to comment on the general importance of updating in the field of natural resources. The questionnaire was sent to all 11,875 natural resource managers and scientists listed in the National Science Foundation's Register of Scientific and Technical Personnel.

The study was undertaken under the guidance of a National Advisory Committee, composed of members representing professional societies, federal agencies and other appropriate organizations. The societies included the American Fisheries Society, the American Institute of Biological Sciences, the Society of American Foresters, the Society for Range Management, the Soil Conservation Society of America, and the Wildlife Society. Federal agencies included the Soil Conservation Service, the U.S. Forest Service, the Bureau of Land Management, the Bureau of Sport Fisheries and Wildlife, and the National Park Service. In addition, there were committee members representing the American Forest Institute, the National Science Foundation, and the Sport Fishing Institute. Several universities were represented as well.

Wildlife and fisheries were specifically represented by Elwood A. Seaman and Robert F. Hutton of the American Fisheries Society; Eugene Dustman and Fred G. Evenden of the Wildlife Society; Howard S. Huenecke, Keith M. Schreiner, John Gottschalk, Spencer Smith, and Leslie Glasgow of the U.S. Bureau of Sport Fisheries and Wildlife; R. M. Martin and Richard Stroud of the Sport Fishing Institute; and Robert L. Butler, James S. Lindzey, and Robert G. Wingard of The Pennsylvania State University.

### *General Characteristics of Wildlife and Fisheries Managers*

The wildlife and fisheries managers who were surveyed represent a reasonable homogeneous group. Of the 1,241 who completed the survey about half designated their current area of work as wildlife and half as fisheries. Of the wildlifers, 36 percent indicated that they were federally employed and 50 percent that they were employed by state governments. Similarly, 42 percent of the fisheries personnel were federal and 48 percent state employees. Geographically, about 32 percent of the wildlife personnel are employed in the North Central states, about 21 percent in the Mountain states and about 12 percent in the South Atlantic states. Of the fisheries personnel, 30 percent work in the Pacific region, 21 percent in the North Central states, and 14 percent in the South Atlantic region. Average age of those responding is 42, and length of professional service averages 17 years. As for educational level, about 48 percent of the wildlifers hold a master's degree or have taken some graduate training, and 12 percent hold a doctorate. For the fisheries personnel, the figures are 57 percent and 19 percent respectively.

### *Updating Needs*

Of the items presented for consideration in connection with updating needs, those ranked highest indicate desire—as might be expected—for more and better training in the general area of new technologies—that is, in the skills and competencies traditionally associated with training in resource management. But the most interesting result of the survey is that an almost equal number expressed a need for further training in various aspects of ecology and environmental management. Table 1 shows the areas of knowledge most frequently specified as needed by fisheries managers, and Table 2 gives similar information for wildlife managers.

### *Comparisons with Other Natural Resource Personnel*

It is interesting to compare the self-perceived continuing education needs of the various groups of natural resource managers. Although in all respects there is remarkable similarity among the different occupational specialties, there are some interesting differences in the areas of knowledge specified as needed. Table 3 shows the top indicated needs of the group as a whole and additionally gives figures in each case for fisheries managers, wildlife managers and forestry managers.

Table 4 shows the areas of knowledge specified as *not needed* by the group as a whole and by the fisheries managers, the wildlife managers, and the foresters.

### *New Directions*

These needs represent, both in type and extent, a new dimension in the continuing education of the personnel involved. Significant changes are clearly required in present updating practices.

For the wildlife or fisheries manager who must face problems of constantly growing complexity and diversity, the situation is acute. The enervating demands of his expanding role dictate that his updating be done in the most efficient and stimulating manner possible. Uncoordinated reading of periodi-

**Table 1. Specific areas of knowledge indicated as needed by fisheries managers.**

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Of the fisheries managers surveyed, 80 percent or more indicated that they "should have" or "could use" training in:

New technologies (90 percent)

Ecosystems (88 percent)

Environmental management (86 percent)

Pollution and environmental quality (83 percent)

Interrelationships of the natural-resource scientist, social scientist, and planner (82 percent)

Population dynamics (81 percent)

At least three-quarters of the fisheries managers want training in:

Pollution biology (79 percent)

Inventory, census, and measurement (79 percent)

Long-range planning (76 percent)

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cals and reports is not enough. Occasional workshops and seminars (which he attends when he can be spared from the job) cannot fulfill the extent of his needs. On-the-job training is often too infrequent, as well as narrow and uncoordinated in approach.

What today's wildlifer wants and needs is commitment on the part of his organization to his continuing education as an accepted, regularly programmed, and substantial part of his employment. Considering the rate of change in the development of new knowledge and in its application to environmental problems, it seems evident that at least 20 percent of the working time of the natural-resource manager—the equivalent of one day a week—should be devoted to regularly scheduled continuing education activities.

#### *An Educational Resources Center*

Certainly an important part of any continuing updating effort should be the establishment, in cooperation with academic institutions and appropriate professional societies, of a national center (or a number of regional centers) specifically charged with the development of environmental education courses and programs to be used in the training of practicing personnel.

Such a center could have the resources to bring together the most recent information from the frontiers of knowledge and could develop a core of necessary courses, programs, and materials for widespread dissemination. The expertise of top-ranking professionals in specialized areas could be drawn upon as needed, not only in resource technology but in the social, economic, political, and administrative areas as well. Use could be made of modern instructional technology, such as videotapes, cassettes, computer-assisted instruction, corres-

**Table 2. Specific areas of knowledge indicated as needed by wildlife managers.**

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Of the wildlife managers surveyed, 80 percent or more indicated that they “should have” or “could use” training in:

- New technologies (92 percent)
- Environmental management (88 percent)
- Ecosystems (87 percent)
- Interrelationships of the natural-resource scientist, social scientist, and planner (85 percent)
- Pollution and environmental quality (81 percent)

At least three-quarters of the wildlife managers want training in:

- Recreational use (80 percent)
  - New methods of remote sensing (79 percent)
  - Pollution biology (79 percent)
  - Site quality or synecological evaluation (79 percent)
  - Promoting community interest in natural resources (78 percent)
  - Land use in regional planning (78 percent)
  - Long-range planning (78 percent)
  - Inventory, census, and measurement (78 percent)
  - Programming, planning and budgeting systems (77 percent)
  - Use of media (76 percent)
  - Applying modern information systems to natural resource problems (76 percent)
  - Population dynamics (76 percent)
  - Conference leadership (75 percent)
  - Effective communication within the organization (75 percent)
  - Environmental interpretation and extension (75 percent)
- 

pendence courses, telephone lectures, films, etc., to prepare materials for on-the-job training programs, workshops and conferences, short courses, and individual instruction. The instructional material thus developed would represent the best available in both subject matter and method of presentation. This material could then be modified and supplemented for use by federal, state, and local agencies, by industry, and by universities to fit specific needs.

Such a center should be used for providing educational programs not only at the professional managerial level but also at the technician level. Special emphasis could be given to developing programs for disadvantaged and minority groups.



**Table 3. Areas of Knowledge most frequently specified as continuing education needs by all natural resource managers, and specifically by fisheries, wildlife, and forestry personnel (percent).**

	All Managers	Fisheries	Wildlife	Forestry
New technologies	88	90	92	86
Environmental management	87	86	88	86
Interrelationships of natural resource scientist, social scientist, and planner	83	82	85	81
Pollution and environmental quality	83	83	81	82
Ecosystems	79	88	87	74
Effective communications within the organization	79	74	75	81
Long-range planning	78	76	78	79
Recreational use	76	67	80	77
Pollution biology	76	79	79	72
Human aspects of management	76	72	73	79
Promoting community interest in natural resources	75	66	78	77
Site quality or synecological evaluation	75	68	79	77
Effective reading skills	75	72	74	74
Programming, planning, and budgeting systems	74	72	77	79

A further objective of such a center would be to pioneer needed assessment or evaluation studies, including cost-benefit analyses and pertinent research to determine the effectiveness of the instructional programs and techniques.

*Complete Report*

The complete report of the Penn State study is available as *Continuing Education Needs of Natural Resource Managers and Scientists*, by John L. George, School of Forest Resources, and Samuel S. Dubin, Department of Planning Studies in Continuing Education. It may be ordered from Planning Studies in Continuing Education, 2 Shields Building, The Pennsylvania State University, University Park, Pennsylvania 16802. The cost is \$5.00 per copy.

**Table 4. Areas of knowledge most frequently specified as not needed by all natural resource managers, and specifically by fisheries, wildlife, and forestry personnel (percent).**

	All Managers	Fisheries	Wildlife	Forestry
Vertebrate and invertebrate identification and ecology	73	60	59	73
Problems of inner city	67	75	67	67
Genetics and breeding	62	52	62	62
Review of basic mathematics	57	46	52	57
Mathematical modeling techniques	56	43	52	56
Mathematical programming techniques	52	41	46	52
Urban resource development	51	74	61	51

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### Discussion

DISCUSSION LEADER GRIFFITH: Since this is an Information and Education Technical Session, Doctor, could you tell us how the department or the agency's I&E staff could become involved in the kind of program you are describing? Jim Keefe, of course, stressed the need for continuing professional training in Information and Education for those people in it. But does I&E involvement go beyond that?

DR. GEORGE: As I say, all universities today and I am sure all state and federal agencies, have increasing funds in this area. I don't think they have enough and we are all going through periods of organizational growth that make it difficult. I can just tell you that at Penn State one of our difficulties is changing from essentially an agricultural college to a university. You see, the extension people, which is a tremendous organization, have been doing parts of this for a long time and now are forming a whole new section of Continuing Education for the rest of the University.

I think we are going to have research. We are going to have to get together and we are going to have to plan. That's all I can say.

MS. LORAIN LEVOUGH [Student, University of Colorado]: Just how much math did the subjects of your study have? You noted that they wanted more math modeling and things like that, but they didn't want to take more math.

DR. GEORGE: This group that we were studying were the elite group of managers. They had all been out of school for some time. One of the reasons why we felt that they might be in need of some continuing education was because of quantitative methods. One of the big changes in education in the last two decades, certainly in the last decade, has been the amount of math. We had boys who finished up a degree and then went to Viet Nam for two years and came back, and they had deficiencies in mathematics because the curriculum had changed that rapidly. Most of these managers knew they were deficient

because in the open-ended questions they expressed concern and fear about the young person because he was somehow a person who was better trained in biometrics and they felt a little uneasy with that. But they did retreat to the position that they had had more experience which is a valid position, but not with math.

Many of these people were managers. Therefore, they wanted to know how to do things quantitatively, but they didn't want to go back and do the basic math. If they had been educators, it would have been the other way around. And this is all right, too.

Finally, and there is no way of our telling this, our young people today are more quantitative and they have perhaps better chemistry, but they have poorer biology. You see, we had to give up something and what we have done is to give up biology. The old biologists were better trained in many ways than the modern ones.

DISCUSSION LEADER GRIFFITH: On the basis of your polling, was there any indication that a share of the in-service training workshops, short courses, or whatever that level of training, particularly in communications, of the resource worker could be carried out as a responsibility of the agency Information and Education staff?

DR. GEORGE: Very definitely, and in all levels—the university, the state action agency and the federal. It is just that we have found that our problems are so similar at all these different levels that it would be very efficient to get together and pool your limited financial resources and your techniques. For example, I wish that we had some of the knowhow and expertise of the Missouri people in putting out films. It would be great. This doesn't mean that they all have to be on the same subject. But I mean they could help in a national or a regional center, because there are other films that they can think of and that we could all use. The material could all be adapted for local places.

What these managers and what the personnel officers told us was that these things have to be very carefully planned or they can be real bombs. They told us that they had tried practically everything that the natural resources managers and scientists said they wanted, but, for some reason or another, many of them failed and very often it was because they hadn't done enough preparatory planning.

One of the things that is very important is training. You can't go into advanced mathematics with a beginning group. So you have got to screen the group. This was one of the reasons they felt that some of their quantitative programs failed merely because there was one group that was being told something they already knew and they lost interest and the other group couldn't understand what was being talked about, so nobody was happy.

DR. CUTLER: I thought that I could supplement something that Dr. George dealt with from the standpoint of our experience at Michigan State University.

There are two things. One is that we offer quite a number of courses at night from our Department of Resource Development, in such things as environmental law, watershed management, environmental policy, and this kind of thing, which attracts quite a number of middle management types in our state's Department of Natural Resources who are able to enroll as graduate students working toward a master's degree in our Department, and over a period of four or five years working primarily through these evening courses, but occasionally getting permission to take time off during the day to finish this curriculum, obtain their graduate degree in this way.

The second program is the one that Dr. George alluded to involving federal interns by which hand-picked federal agency people—forest rangers, people from National Forest supervisory staffs, people from the BLM, the National Park Service, and other—after five or ten years' experience with the agency are chosen to come back on full salary and are given nine months of a year to work toward a graduate degree at a university. The University of Michigan and Michigan State University have been able to attract, over the past half dozen years, on the average of a dozen to fifteen people from the Forest Service, the Bureau of Land Management, the Bureau of Sport Fisheries and Wildlife, and they take courses in administration, communications, management, policy, economics, P.P.B., other kinds of courses to make them better administrators.

It seems to me that we could also develop a curriculum that would attract and help people in communications, both I and E types and also people from line administrative positions who want to improve their communications skills, and attract people from the information and education staffs as well as from these line administrative positions. So these two options have been explored with the state and federal employees.

MR. TOM TOWNSEND [Ohio State University]: I noticed on the one slide that there seemed to be very little correlation between the supervisor and the individuals's desire to improve himself. Do you have an comments from your data on how this can be improved?

DR. GEORGE: We did have an open-ended question which would give you information on this sort of thing. It is the kind of thing that was very difficult to qualify.

May I just say that I found the personnel, the officers of the Bureau of Sport Fisheries and Wildlife, the U.S. Forest Service, the BLM, SCS, and the National Parks Service all to be very able people who are deeply concerned with these problems, and they gave us the benefit of their knowledge about these problems. It seems it is the same guy who doesn't have any part of further education who is the basis of the trouble. He is in a good position; he's got a fairly good GS rating; he's happy and he is just content. He is just a very happy man and apparently he does not stimulate his subordinates for further training. If there is going to be any stimulation at all, at least from this study, it seemed like it had to be innate. This is the conclusion of Dr. Dubin, the psychologist who worked with me here.

Now how you change these inner values is, of course, getting beyond the natural resources manager. Dr. Dubin tells me that this is something that is terribly difficult. We do note a tremendous change in the attitudes of our younger generation, and this change is true on natural resource matters. I suspect that some of us were responsible for this. I think wildlife is responsible for this. We are responsible for far more than we know. I think we have already done a very good job of making people aware of the need for husbandry and shepherdism.

I would say if there is any area in which we are deficient and which we have neglected to discharge our responsibility, it is in the inner city. Most of us are not the type of person that wants to go into the inner city. We are in our work because we want to get out of it. The Forest Service is starting a consortium approach on urban environmental problems. A lot of people are working on it. The Bureau of Sport Fisheries and Wildlife is. I think really to motivate additional effort in this area, we are going to need ethnic minorities.

# The Function of Repeated Primitive Wilderness Living Experiences in the Development of Inner City Children's Identification With and Understanding of the Natural World

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The objective of the study is to assess the effects of two different methods of learning about wildlife and wilderness. Both methods have the goal of inculcating interest in, enjoyment of, and appreciation of wildlife and wilderness and its importance to the world today. Further, with a sample of urban ghetto children, the study assesses the possibility of making the conservation (wise use) of natural resources and wilderness living relevant to their lives.

Two hypotheses were tested:

(1) Periodic, repeated exposures to wildlife in wilderness living experiences, coupled with in-school ecological studies in the interim, will be more effective than the common public school practice of providing a single experience of up to five days' duration.

(2) The more natural (primitive) the educational setting, the more thorough the desired effects.

The sample consists of three classrooms of students from an inner-city school in a large metropolitan area. The first or "UNIFY" method, named after the group which designed and operated the program, was used in a program containing 35 children from two sixth grade classes. The second or "traditional" method was used in a program for fifth grade students; 14 children from one of the fifth grade classes were tested for purposes of this study. Part of the UNIFY sample were enrolled the previous year in the traditional group program, and are tested separately. It was not administratively possible to assign same-age students to both programs. Although age differences between fifth and sixth graders may confound results, it is felt that fifth graders are socially mature enough to attain the programs' objectives for this to be a valid test.

The two programs were run independently of each other. The UNIFY method program was developed especially for the school in which it was administered, as a pilot program to be expanded later. It was designed and operated by a nonprofit ecological education organization, the Urban Nature Institute for Youth. All staff and student expenses were provided by the Institute. The traditional method program was offered by an established educational camp with a permanent staff. Students' participation in it was funded by a federal educational subsidy. A brief description of the two programs is given below.

## Description of Programs

In the UNIFY program students were introduced to primitive outdoor living in a series of five three-day experiences (Friday-Sunday) in a variety of habitats in nearby parks and game and nature preserves. Camping weekends started in February and followed at several-week intervals during the spring school semester, affording campers a chance to assimilate camping experiences in home environs. In the intervals between camp-outs, weekly wilderness orientation and urban ecological studies sessions were held in the classroom or outdoors in the school neighborhood.

Camping style quickly progressed from screened platform tents and a cook house the first weekend to umbrella and Army surplus pup tents (or none) and campfire cooking. Students and teaching staff performed all the camp chores together; it was felt that exercising responsibility for one's self and consideration for the natural setting is an important means of assimilating wilderness experiences.

The main educational goal of the program was achieving interest in, enjoyment of and appreciation of the environment—all best realized, it was felt, by maximum direct exposure to the environment. Each different ecological habitat was explored by means of hikes (some as long as ten miles), games and a variety of activities. These activities included making live traps (all game captured was soon released), making natural dyes and weaving, making casts of wild animal tracks, and Indian dancing. Concrete ecological educational objectives were pursued by means of informal discussions accompanying hikes and activities, and the more formal school classroom sessions. The program was viewed more as an addition to, than as an extension of, the regular curriculum.

The UNIFY method is predicated upon having a very energetic, flexible staff, with a variety of backgrounds in ecology and the arts. Campers were divided into two groups, with the second following the program sequence of the first a week later; therefore staff worked most weekends and several days during every school week. Program staff had no regular classroom responsibilities, beyond classroom program sessions. Regular classroom teachers were encouraged but not required to attend all program activities, at school and at camp, but only as observers. There was a low student-staff ratio (about four to one) at camp, and a higher ratio in school.

In the traditional method program, students were housed for five days in a dormitory cabin setting in a natural wooded area. Classroom teachers were provided with written guides for preparing their students for their camp experience. A counselor from the camp also visited the classroom to discuss the program with the students.

Camping style was that of the typical summer camp, with food prepared and served (with the exception of two cook-outs) in a main dining hall. Staff were differentiated into counselors and teachers. Various activities were scheduled during the day in five approximately one-hour activity periods, mixed in with informal sports and free time.

The program was viewed as an integral part of the school curriculum—an extension of the classroom to an outdoor laboratory. It emphasized direct experiences in all phases of the regular school curriculum involving native materials and life situations, as a means of increasing environmental awareness.

## Evaluation of Programs

### *Method*

Data for evaluating programs are of two types: Students' responses to an end-of-program review questionnaire, and observations made by program personnel, classroom teachers and school administrators. The questionnaire consisted of a camping and wildlife attitudes section and a short ecology quiz. Due to a wide range in reading skills in the sample, a questionnaire and form of presentation with little reliance on reading was devised. All questions were read aloud, and were represented in the quiz booklet in most cases by pictures, not words. Most answers were multiple choice. The preference section used a thoroughly pretested format. No formal test of reliability was performed on the questionnaire items. However, item scores on the ecology quiz clustered around the mean, with all but two falling within one standard deviation. The researcher and a program coworker administered the questionnaire.

### *Results*

Program results are evaluated on three criteria: ecological learning, expressed appreciation for the camp experience, and observed adaptations to that experience. Ecology quiz scores of the new method group averaged 63 percent, those in the traditional group, 35 percent. The difference between the means was significant beyond the .001 level on a two-tailed test with a pooled variance estimate. Interestingly, those students in the UNIFY group who had attended the traditional method program the previous year did less well than those who had not. The quiz included concepts such as the water cycle, food chain, and causes of air pollution.

Appreciation of outdoor school attributes was fairly widespread among participants in both programs, as measured by the attitude questionnaire. A majority of students in each program, boys as well as girls, expressed appreciation for nine of the 19 items. These items consisted of four aspects of the natural environmental setting (clean air, healthy, pretty, different from city), three activity items (playing in the water, sleeping in tents, and running and hiking as far as you want), and two social "opportunities" of the camp setting (the opportunity to be alone, and the fact that there were few people around). In addition, boys in both groups, but not girls, appreciated being away from city friends, not worrying about getting clothes dirty, and playing with snakes and animals. The boys in the traditional method group failed to appreciate the trees, quiet, and safety of the natural setting, and the opportunity to cook, while the girls in this group were the only ones to appreciate the absence of radio and television, but not the opportunity to be away from home.

The only substantial difference between groups apart from those noted above was that even more boys in the UNIFY program (75 percent of the group or more) appreciated the items approved by at least a majority of boys in the traditional program. In addition, those boys in the new method program with previous camp experience in the traditional program were more appreciative of their wilderness living experiences; this did not account for between program differences, however.

Behavior adaptations to the camping experience were measured solely by observation. A progression of striking behavioral changes was observed during

the UNIFY group's semester-long experience. Campers, in particular the girls, spent much of their time at first chasing away flying insects, changing outfits several times a day to keep clean, and staying close together. By programs' end, campers had become nonchalant about bugs in their sleeping bags and fearlessly lead night hikes. There were no similar opportunities for acculturation in the control group.

Informal instruction in a natural environment yielded an unexpected dividend. Regular classroom teachers who observed the two outdoor school programs commented on the effectiveness of the new method program in particular at breaking up undesirable behavior syndromes. They noted an almost complete absence on camp-outs of fighting, organized social disturbances and personal friction that were often a part of the students' school experience.

Experience in the new method program over the extended period of three months lead to greater receptivity to other non-school educational activities. This observation was noted by a scientist-educator at a scientific research station after the group visited there, and was based on his experiences with many hundreds of similar-aged school children.

## **Discussion**

Students in the two programs under study were found to differ significantly on an ecology quiz. Those in the UNIFY program outperformed those in the traditional program on the quiz. The preference questionnaire proved inadequate for differentiating between participants to a great extent. What differences there were may be related mostly to the age and maturation differences of the two groups. The questionnaire probably failed to elicit responses based on actual experience: items which were present as experiences only in the UNIFY program—sleeping in tents, water play, and to some extent cooking and hiking—were appreciated, according to campers' responses, as much by traditional method campers as by UNIFY campers.

The informal educational setting and sequenced pattern of environmental exposure of the UNIFY program were observed to be associated with striking behavioral changes. Lessened social aggression and greater educational receptivity to other educational activities were noted by observers. Great strides in adjusting to primitive camping styles and activities and appreciation of the environment were made by students in the UNIFY program. Few similar demands or responses were made in the traditional program.

Confirmation of sizeable differences in effects of the two programs on internalization of the camping experience may be deduced in the following way. Many of the students (82 percent of the girls, 31 percent of the boys) in the UNIFY program had experienced the traditional program the previous year. However, the frame of reference which the "experienced" girls (and many boys) brought to the primitive camping program, even to the introductory first weekend cabin sessions, was urban. This was denoted by a lack of interest in exploring or moving away from buildings, and an anti-bugs, pro-spotless, fancy clothing and absolute privacy in constantly-swept-clean-buildings orientation. It is not possible to determine with the present data the effects, if any, of these campers' earlier traditional camp experience on the speed or ease of adaptation to the primitive camping experience, nor is it possible to deter-



mine what had been lost in the intervening year. Suffice it to say that the students' frame of reference did not appear to have been changed by their earlier experience.

### **Summary and Conclusions**

Two methods of teaching about wildlife and conservation of natural resources were investigated. The first featured an informal educational approach with five primitive wilderness living experiences sequenced during the school term. The second entailed a more traditional, formal approach, with one five day visit to a permanent cabin-style camp. Subjects were drawn from an urban ghetto neighborhood elementary school. Students in the first, more innovative program scored significantly higher on an ecology quiz administered to both groups. Students from the first group also made greater behavior adaptations in the course of their camping experiences. They became much more receptive to exploration and investigation of their natural surroundings, and less socially aggressive and destructive. Results of a questionnaire evaluating students' appreciation of their outdoor school experience showed that students of both groups were roughly equally appreciative. The results seem to justify the conclusion that the methods of the innovative program are superior for attaining the two programs' common objective.

The results seem generalizable beyond the present study, subject only to availability of funds and proximity of adequate natural areas. Many wealthier school districts are now allocating funds to traditional type programs. It is believed that the alternate type of program reviewed here would be competitive financially, although organizationally more complex.

Management implications: Camping facilities in most regional parks receive little midweek use during the school year. Park managers could aid school systems in planning programs to make use of these already available facilities for environmental education programs as described herein, without any increased financial investment in land.

### **Acknowledgments**

We wish to thank Michael J. Holway, principal of the school attended by students in the study, for his extremely generous cooperation. We wish to express gratitude to the many organizations and individuals through whose financial support the UNIFY program and this study were made possible. Finally, recognition must go to Huey Johnson, Susan Henriques, Ed Washington and Bonnie MacGregor who were instrumental in establishing the UNIFY program.

# A New Foundation for Environmental Education Progress in Wisconsin

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In Wisconsin we like to quote Aldo Leopold, and it is helpful to begin this description of Wisconsin's environmental education efforts with a quote from his foresightful *Sand County Almanac*.

Conservation is a state of harmony between men and land. Despite nearly a century of propaganda, conservation still proceeds at a snail's pace; progress still consists largely of letterhead pieties and convention oratory. On the back forty we still slip two steps backward for each forward stride.

The usual answer to this dilemma is "more conservation." No one will debate this, but is it certain that only the *volume* of education needs stepping up? Is something lacking in the *content* as well?

Several elements in that quote and other writings from Leopold can serve as themes for gauging both our current activities and the prospects for success or at least modest progress. First is his simple definition of conservation. It seems to say even more to us today than it did when written. After 25 years we are an even more urban and technological society which, until the oil crisis, was only mildly concerned about the adequacy and quality of environmental resources and the direct impact of continuing adequacy on our life style.

Leopold also said, "Conservation is a bird that flies faster than the shot we aim at it." He was pointing out that the conservation task grows greater through time, and so it has as problems and issues become increasingly complex. At the same time, as he also recognized, "*In our attempt to make conservation easy, we have made it trivial.*" The same might be said for conservation education.

Finally, it seems we have often pursued inadequate topics—the matter of conservation education lacking in content. Then too, we may have tended to overlook the back forty with efforts to dramatize and impress with situations such as Lake Erie or Los Angeles' smog. There is so much concentration on such overworked environmental issues that we may be losing sight of what is actually happening to our individual living environments.

## **Establishing an Environmental Education Process in Wisconsin**

My intent is not to demean the outstanding record of Wisconsin in conservation education. Such activities in the state have been generally recognized as among the strongest. It is mainly that the educational challenges were growing larger than our efforts to keep pace. The conservation bird was flying faster.

Consequently in the 1970's Wisconsin joined with many other states and the Federal Government in conceiving of environmental education as a new activity incorporating the legacy from conservation, outdoor, and nature education. I

do not want to become enmeshed in definitional problems surrounding environmental education. That issue merely reveals that the concept has not yet matured and that semantic difficulties ever plague us. Nevertheless, several aspects are crucial to the new concept: information, understanding, and resulting participation in action. Currently in Wisconsin we are using the following definition:

Environmental education, which includes conservation education, is a process of learning about man's interrelationship with natural and man-made surroundings; of developing skills and values for resource conservation, resolving resource use conflicts, maintaining a productive and healthy environment; and of fostering motivation to apply skills and attitudes to assure our survival and to improve the quality of life.

While it would be desirable to describe a number of converging efforts, the best landmark for discussing the emergence of environmental education in Wisconsin is through the Wisconsin Environmental Education Council (WEEC). The Council was created by Executive Order of Governor Patrick J. Lucey in May, 1971 in response to a recommendation of his Environmental Task Force. Although the Task Force proposed legislation for a council, the Governor chose to expedite action on the idea by creating the WEEC directly.

The order charges the Council with responsibility for preparing a state environmental education plan, coordinating activities, and assisting various interests in accomplishing their environmental education objectives. A strong mandate and one aware of deficiencies in preceding activity. Further, the makeup of the Council assured that the charge was not viewed as trivial. Designated as members were the Superintendent of Public Instruction; Secretary of Natural Resources; President of the University of Wisconsin System; Director of the State Board of Vocational, Technical and Adult Education; Director of the Educational Communications Board; a State Senator; a State Representative; a gubernatorial representative; and an Executive Secretary. It should be noted that the first four mentioned agencies have statutory responsibilities for conservation education according to several acts dating back to 1935 when instruction in conservation of natural resources was mandated for public school pupils and teachers.

In retrospect, that choice of membership was especially fortunate. Not only were most of the named principals active, but so were appropriate agency personnel. Merely bringing together key agency leaders for meetings has significantly improved interagency communication and awareness of opportunities for cooperation on mutual interests.

As significant as the level of Council membership is its charge to appoint a representative advisory committee. Currently, 15 volunteers play a visible contributing role in overall efforts. Indeed, it has been to its Advisory Committee that the Council has turned for major assignments, the best illustration being preparation of a state plan. Advisors are chosen to be representative of a wide range of backgrounds, including teachers, school administrators, representatives of environmental organizations, organized labor, industry, higher education, civic groups, students, local government, and the media.

By operating in a complementary fashion, the Council of agency representatives and the Committee of volunteer advisors have formed a fortuitous

institutional arrangement. Along with participation by officials in a new framework has been the development of the Advisory Committee as a sounding board and initiator of proposals for progress.

### **Environmental Education Planning**

During the initial two years most of the effort was directed toward developing a state master plan for environmental education. One of the most difficult aspects of applying a new concept, such as environmental education, is planning. There is no need to explore that point since it is the subject of another paper for this panel, but Wisconsin did suffer from a number of problems. Nevertheless, a draft plan was released in April, 1973. The purpose behind releasing an incomplete draft document was to open wider the process of planning to gain inputs even beyond what the representative Advisory Committee could draw upon. The belief was basically that to develop a comprehensive program for improving environmental education in Wisconsin, there would have to be concurrence among the diverse interests in basic goals, objectives, and priorities, coupled with agreement on cooperative participation in expansion and improvement of activities. Therefore, the Committee left the program recommendations section open for suggestions on program needs and opportunities. Since, the Committee has been seeking reactions to the draft plan, partly through scheduled public discussions, and through distribution of the plan.

The basic goal chosen for environmental education "is to enhance development of an environmental ethic in Wisconsin." As the plan states:

Such an ethic must become an operative set of principles and concepts guiding environmental stewardship. For its achievement we must gain better awareness of our dependence upon natural resources for material and esthetic sustenance. There must be understanding of our technological capabilities and limitations and of conflicts which may arise over goals based upon a single concern for technology, economics, politics, esthetics, or ecology. Finally, there must be a response resulting from being better informed. Such activity may range from gaining new enjoyment or pleasure from nature study as an enriching experience, to a personal commitment to work professionally or avocationally for environmental use which balances use and protection. It should involve commitments by individuals to lead personal lives compatible with an environmental ethic.

In addition to proposing goals and objectives for environmental education and a section on preliminary findings, the plan contains a unique approach to establishing priorities and recommendations. The central chapter describes, first, the participants who provide or receive environmental education. Among the twelve sectors are a few such as: business, professions, and industry; labor organizations; instructional and commercial media; citizen and civic associations; and service, fraternal, and religious organizations which tend to be overlooked.

The next part of the chapter describes thirteen categories of new or increased activity considered to be attainable with existing funds and staff. As examples, the primary ones are: teacher in-service education, statutory review,

assessment of physical facilities, development of school-community programs, assessment of the role of instructional television, and education about current environmental issues. Finally, the chapter lists the primary environmental issues in Wisconsin toward which current environmental education should be directed to assist in their analyses and resolution. There is general agreement that environmental education is issue oriented, but seldom are specific issues identified as themes around which environmental education can be programmed. Wisconsin's plan lists eight types of issues including energy, balanced transportation, environmental health hazards, land use, and private recreational development. The rationale for that approach can best be understood by quoting directly from the plan:

The issue approach is important because it seeks improved understanding of the specific conflicts and alternative choices. Each issue also illustrates the human dilemma of resource use which may result in potentially harmful side effects, misallocation, quality deterioration, or involve restoration and other dimensions of improvement. Deeper study can lead to a search for underlying guiding principles of an environmental ethic. Thus, the issues are current illustrations of a continuing struggle within society to apply an ecologically sound approach to environmental use. Some current examples are listed in the Appendix.

Perhaps then, examination of a pressing issue will lead us to question our attitudes which may generate undue and unsustainable demands on natural resources, or cause conflicts among uses which have varying benefit to society.

The question may be raised, why concentrate on a few central and controversial issues? The essence of environmental education, as a purposeful public activity, is an objective, comprehensive grappling with the direct problems of environmental quality which confront us in Wisconsin. Environmental education is a complex process which must center on relevant concerns. We do not yet know what contribution an environmental ethic can make to our individual lives and to public goals, but we will begin to understand by considering our specific problems and issues.

Further, the approach offers a way to consider what educational resources are available for analyzing, discussing and educating about respective issues, and who is involved in vital decisions.

Third, the issue concentration provides a finite basis for educational programming. The issues are current now but may be replaced by others in a few years. This plan must be reexamined and evaluated for its ongoing timeliness and effectiveness.

Fourth, the issues clearly reveal how complex and interrelated environmental problems are. They suggest a cooperative, multifaceted approach with attention to demonstrations and testing.

The final chapter is, as mentioned, open ended. It proposes that groups and individuals examine their efforts and interests in relation to preceding planning discussion. An analytical chart is provided for use by readers in identifying appropriate roles, according to overall goals to be followed by listing of specific needs and activities to meet them.

## **Current Programs**

Despite the concentration on planning, the Council has not waited for plan completion to undertake some needed activities and to provide assistance. For example, it was called upon to review a proposed building program to provide residential facilities at the MacKenzie Environmental Center operated by the Department of Natural Resources. Before releasing appropriated funds, the State Building Commission requested the Council to review the need for overnight facilities, the programs to be offered, and how the proposal relates to other similar facilities and programs. In its report, the Council endorsed the provision of new facilities and offered to assist in preparation of detailed programs. The prospect endorsed by the Council is that the Center become a state demonstration area to meet a variety of needs and assess how potential activities contribute to improvement of environmental education. Subsequently, the Council and the Department of Natural Resources have cooperated in development of policies and programs to be implemented when the new center is completed.

The Council has also assisted in a number of small demonstrations of ways to advance environmental education. Through grants and assistance from Council and member agency staffs, about twenty projects were undertaken in the past year.

Five of the projects dealt with in-service training of teachers and educational administrators. Two offered special training in use of outdoor areas and the local community for environmental education to give teachers better skills in exposing students to direct experiences outside the classroom. Another used the Wisconsin River as a learning resource for a summer course. The class explored and analyzed the physical, social, and economic dimensions of the river valley. Finally, one school used grant funds for a summer workshop to evaluate its pilot environmental education program from the preceding year and to begin planning for a stronger program for the coming fall. A related but distinct project brought together school administrators for an introductory field workshop on environmental education and how it can be accomplished in their system.

Another type of activity involved students in learning about their community environment. Some projects undertook constructive work such as development of a mini-park while another prepared a history of an expanding urban fringe area of Madison along with a field guide to the study of its ponds and woods. To be used by middle school students, the resulting report provides a basis for interdisciplinary investigation of what is happening to land in the community.

Other projects also were focused on schools, but some were directed toward nonformal environmental education, considered a priority by the Council. One project provided leadership training for members of environmental groups and concerned individuals. Participants explored land use as a basic state issue and had demonstrations of various citizen action approaches. The media were involved through a pilot radio series describing the variety of landforms and unique environmental resources of Wisconsin. Through on-site sounds and discussion with local naturalists, a promising radio format was developed, and the first series of programs was broadcast on the state's educational radio network.

The brief mention does not do justice to the range of progress accomplished through the series of demonstrations, and more detailed information is available through the Council's annual report for 1973. Through the experience the Council has gained useful tests of new ideas and suggestions for general application in the state.

### **Environmental Education: Observations and Prognosis**

Rather than offer further description of what has been happening in Wisconsin, I would like to make some observations about the status of environmental education in Wisconsin and beyond. This may be helpful in needed examination of the concept after a few years of activity in seeking its application.

First, Wisconsin has reorganized an already active resource education commitment in recognition of the new concept. Basically it focuses now on human relationships with the natural environment, and necessary understanding and action to make such relationships sustaining, if not fully harmonious.

By that recognition, a number of new contributors have been formally added to the process. Participating in cooperative policy making are representatives of the state's public radio and television system, executive office, university system, and technical school system, along with the more traditional natural resources and education agencies. Legislative representation contributes a further helpful dimension. It establishes a new and broader mix.

Second, the planning process has concentrated on identifying direct means for contributing to protection and improvement of the environment and the quality of life in Wisconsin, as charged in the executive order. The draft plan has some unique characteristics in that it concentrates on current issues as a focus for environmental education activity. The plan is a working version released to gain feedback on its contents, but is also serves as an interim program guide until a final plan is adopted.

Next, plan implementation and other activities have proceeded in tandem with completion of the planning process. Interagency cooperation, before the Council's creation, was significant, but the existence of the Council facilitated additional efforts. Whenever opportunities to be of assistance have occurred, the Council has responded and the value of such efforts is evident. Too often, a planning activity proceeds without tangible results beyond planning reports. Fortunately, those involved in Wisconsin can see evidence of progress resulting from existence of the Council. Development or adoption of a plan cannot be equated with essential progress. Concentration on planning can lead to symbolic but hollow progress.

Until this point, the description has been basically a favorable one, and optimism about Wisconsin's efforts is appropriate. Nevertheless, some comments about the prospects beyond the brief introductory years should provide a balance worth reflecting upon for the significance of what implications can be drawn about whether or not environmental education can achieve its expectations.

First, creation of a coordinating entity does not assure coordination. Once the first easy steps are taken to close gaps, promote natural alliances among programs, and try some new projects, there comes a reckoning point where

further progress must to some degree involve encroachment upon someone's established turf or challenging evaluation of traditional approaches. Resulting proposals for change are not necessarily welcome or successful. For example, conservation education is not so much a failure as being surpassed by the educational demands of the times. It remains a central contributor to the environmental education process and root of most of the expertise and experience for redefining the concept. Even so, many conservation educators resent what can be viewed as an intrusion, a 'jumping-on-the-bandwagon,' perhaps, by Johnny-come-latelys who may not appreciate the valiant laboring during times when the environment attracted less attention. By its very comprehensiveness, environmental education will suffer from internecine competition, surely beneficial to a degree, but potentially hazardous because of energy consumed by internal struggle.

Second, despite its grandly appropriate concept, environmental education has not yet gained any measure of acceptance approximating its potential. We are still suffering from being trivial. Some would blame the nature study heritage, or a scientific orientation, or concentration on cognitive aspects. More important, probably, is that most of the central topics of the day are not doing much better in gaining public understanding and reaction. Even so, there has been a general recognition of the value of public participation in vital policy decisions. The procedures for public contributions to establishing air and water quality standards, to resource plan formulation, and to environmental impact review are major opportunities. Nevertheless, environmental education has not yet caught up with its responsibilities and role in such matters. Only when it makes a widely recognized contribution will it cease to be trivial.

Next, the demand for environmental education assistance is far greater than can be met by existing resources. While not universally accepted, the environmental education approach is recognized to a degree that the opportunity for application far exceeds the resources. Obviously, the demand has not yet generated sufficient supply, largely because public budgets are so restrictive of new or expanded programs. Environmental education's metamorphosis comes at a politically inopportune time.

Fourth, although the inclusion of diverse interests is essential because the interplay between ecological, economic, and political dimensions of an environmental issue cannot be denied, the involvement is not a comfortable one. The perceptions are so different as to make fruitful communication a continuing challenge. That may mean that progress, even in defining terms and issues, comes frustratingly slow for those representing an environmental protection viewpoint or unfairly unsympathetic from an industrial viewpoint. The conflicts will remain.

Further, communicating balanced stimulating information about environmental issues is a major challenge. It is hard to impress upon someone the long-range environmental implications of a proposal when it seems to have no direct immediate effects to warrant concern. Unless something affects the back forty now, it is not our nature to be aroused—sympathetic, yes, but not motivated. This is a topic which warrants much greater attention than is possible here. The same struggle applies to generation of an accepted environmental ethic.



Sixth, since everyone favors coordination as long as it is someone else who is being coordinated, the application of the idea that better performance will result from complementary actions will generate negative as well as positive responses. Everything is truly hitched to everything else, but many opportunities for constructive interplay cannot be realized because bureaucratic defenses make cooperation risky. The benefits of shared glory may not be enough to overcome the potential loss of clear identity.

Finally, it is appropriate to examine the state role in environmental education. The details differ from state to state, but there should be little challenge to a conclusion that states must assume the primary leadership in establishing objectives and initiating basic evaluation and change. Like Leopold's observation about convention oratory quoted in the beginning, federal rhetoric is hypocritical when juxtaposed with subsequent administrative performance and fiscal support. Broken federal promises leave states to provide leadership. The most regrettable facet of federal renegeing is that, in an emerging field, national guidance offers a vital cutting edge. Instead, at best we have gotten only a sheath but no blade.

As a concluding note, the Wisconsin experience is gratifying because of the caliber of people who are committed to progress in environmental education. Their convictions and expertise will yield vital progress. Nevertheless, it is too early to tell whether or not the bright hope of generating a vehicle for public understanding and response to environmental degradation is on target or an idea whose time has not yet arrived. We do not yet fully know how to keep environmental education from being too trivial, or how to make it relevant to current concern for the back forty, or how to inculcate an environmental ethic into consideration of pressing issues affecting the back forty.

## Discussion

DISCUSSION LEADER GRIFFITH: Dave, having some knowledge of how such efforts have failed in other states, how did you ever get the Governor to shove this through with an Executive Order and then find money in the legislature for it? This seems to be a rather unusual way to approach it, but it is certainly an effective one.

MR. WALKER: That's a good question. I wish I knew the real answer. I didn't deal with this in the paper, unfortunately. As many of you know, if you don't want to take on an issue directly, you create a study group, and that may have been what was sold, in part at least, to the Governor. There is no question about the commitment being there in the interest and the strong support. Nevertheless, if you start off by developing an environmental education plan that is relatively innocuous, it certainly is essential anyway. So, as a first step, it is much easier to institute it yourself as part of your executive policy than it is to take on the legislature until the concept has begun to be a visible contributor. And that is what we are facing at this point. We will, in time, need to work with the legislature and ask for statutory authority to continue the kind of thing we are undertaking now.

We haven't had a lot of money, but I think we are fortunate and this does show the nature of the Governor's commitment in that we have had, unlike many states, a budget for the Council. I think, particularly in the time of cutback in the federal commitment as I indicated, this is absolutely essential for maintaining any momentum.

MR. HARRY HOLCOMB [Teacher, Creighton University, Omaha]: We need budgets, certainly, to carry out these programs.

Do you see any of the systems increasing their budgets or allocating any funds for continuing education of the teachers they have or for hiring environmental education specialists?

MR. WALKER: Most of what we have seen in Wisconsin has been with federal money, particularly through Title III. But I think that it was the feeling of the Advisory

Committee, when they wrestled with this question of essentially having a state budget calling for no new programs or any significant expansion of existing programs, that we ought to look to the existing opportunities and work better with what we already have. We feel that while it may be satisfactory and even the best solution to have people co-ordinated in a school system, there are ways to get around that if you are better organized. And that is basically what our state planning process has been aiming to do—trying to get all those forces that can contribute better organized to accomplish a job. Therefore, with the number of field people available in existing agencies like the university system, the Department of Natural Resources and the vocational school system throughout the state, we can provide resource people for schools that need help if we have a systematic way of doing it and if we can get the teachers aware of the fact that this kind of help is available.

That is one of the reasons that we are concentrating on teacher in-service work. We feel that if we can get the teachers both comfortable in dealing with a controversial interdisciplinary area and also in working outside the classroom so that the students can have a direct involvement with the activities, we can get some of the first steps started. Then if we could prove ourselves through that kind of activity, we can expect to generate the kind of support that it takes for additional budgets.

MR. HOLCOMB: It sounds as though you are favoring an interdisciplinary effort which I am greatly in favor of. Is that the fact? Are you trying to encourage, say, English teachers to use literature that would make students more environmentally aware, and this sort of thing?

MR. WALKER: Yes, that is the only approach. There are two really significant possibilities for improvement, and one of those is the greater concentration at the elementary level where many of the programs are basically interdisciplinary, where the same teacher may be dealing with social studies and with science in the same classroom with the same students. It seems to me that this is a natural. It also is much easier to get students outside the classroom for longer periods of time for field experience at the elementary level.

The other thing is that we have a number of fine demonstrations in the state of interdisciplinary approaches where material has been developed.

A lot of people in the environmental education movement had a kind of death wish, and that is that they think they are going to take on the whole educational establishment and reform it. I think that this is a sure way to disaster because it is not going to happen.

So the real progress that we can potentially see in the state is going to be based on working within the existing constraints providing the English teacher with some tools through which the students can be acquainted with literature of an environmental nature. If you provide the teacher with those kinds of steps and tools, this is the first progress that you can see. Then maybe we can get at some of the interdisciplinary things. But we have to be prepared to live within the existing system.

MR. RICHARD E. ROCCHIO, [Center for Research and Education, Denver, Colorado]: Are there more people being assigned environmental education responsibilities in schools, and is there more money?

MR. WALKER: I think the answer is "Yes." It certainly isn't as much as many people would like it to be. There is a lot of reassigning of responsibilities, but it's a clear assignment. There are more people interested in getting into that field. Perhaps it has slowed some now, but I did see a precipitous rise from 1970 to now.

So, in sum, I guess the answer to your question is definitely yes, but not enough.

# The State of the Art in Environmental Education Planning

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April 22, 1970 was devoted to honoring the earth. It proved to be a new morning for America: The awakening of a nation's concern for a troubled planet. In universities, churches and the media, at local fairs, on signs in store front windows, people were told that the air they breathe, the water they drink, the land they live on, were being exhausted through careless behavior and lack of planning. It wasn't a matter of a quick patch-up job; unless the consciousness of the country became focused toward saving the environment—through immediate and long-range action—the necessities of daily life on earth could no longer be guaranteed.

The challenge was taken up by ecologists, industrialists, politicians, and technologists; but even with these segments of society working to reverse the damage, a gap became obvious. Industry might change its practices, politicians might write legislation; their efforts would disappear into the ecological vacuum if the man in the street didn't change the way he lived. Within months following Earth Day, "ecology" and "environment" had become household words; yet along with a lack of planning among those who had directed the growth of America, at the root of the problem remained the behavior of the average citizen. The onus to change this behavior fell on education.

To some extent, groundwork for the content and procedures of environmental education had been laid during the previous decade, but little emphasis had been given to planning. In the race against time, a shotgun wedding was arranged: The marriage of planning and education was now a necessity if we were to insure the future of the environment and avoid the mistakes of the past.

It was no longer enough for educators to recite the concepts behind man's relationship with his surroundings. They also had to help people learn to apply those concepts in practical ways, examine problems and develop strategies which would actually improve environmental conditions. At the same time, planning for environmental education was needed on a greater scale than ever before, with expansive master plans to encompass efforts previously aimed at specific regions. The earth was in danger because the results of our actions hadn't been forecast. Now the mandate came for wide-scope planning documents, designed with an awareness of cost benefit. (With priority of funding a vital issue, planners had to know precisely how they were going to spend the limited available monies and be able to make this clear well in advance of implementation.)

On a nationwide basis, the passage of the Federal Environmental Education Act (Public Law 91-516) in the Fall of 1970 was the greatest boost given to the entire field. To encourage and support individual states during the ensuing

three years, the U.S. Office of Education funded 12 states specifically for the development of master plans and gave detailed guidelines as to how the grant money was to be used. Incentive came on still another level, perhaps deeper and more significant in its long-range effect than direction and funding. Elected representatives of the American people had given priority and credibility to environmental education. With this sanction, individual states could point to national leadership when calling upon citizens and concerned groups for their participation.

Because of the range of its participative approach, Colorado's planning program was designated a national demonstration project in the second year and funds were made available to the Center for Research and Education (CRE) to give technical assistance to other states. At the end of that grant period a questionnaire on the total experience of planning for environmental education was circulated among 42 states, and in May 1973, governmental advisors joined state planners at a national conference in Estes Park, Colorado, to pool information and suggest further action. As the culmination of this endeavor, the learning, observation and experience have been condensed into a document entitled "Planning for Environmental Education."<sup>1</sup>

This report is not a formal research study, but a synthesis of the authors' own work in the field and ideas from scores of environmental education planners. It includes not only the questionnaire data, the results of the conference, and summaries of master plan documents, but also contains detailed instructions for conducting statewide planning which can be applied to comprehensive planning of any kind. As an informal study of a social phenomenon, it offers a portrait of a nation responding to challenge, redefining basic assumptions in a particular field of human endeavor. The findings and implications of the three-year study are briefly summarized in this article.

### **Ivory Tower to Grass Roots**

Many of those who responded to the Act generally considered master planning to be the most effective way to promote long-range environmental education in their states—a tangible means to coordinate all work in the field and avoid duplication of efforts. Master plans were envisioned as blueprints to generate excitement and motivate organizations, agencies, and individuals to reorder their budgets and priorities. This comprehensive planning approach aimed at providing a base of leadership within each state, creating a mechanism for continual assessment of program needs while evaluating accomplishments and recommending new steps. At the same time, many states did see in master planning the possibility of receiving federal grant money for implementing programs. (According to the grant application guidelines, although a statewide master plan was "not required for funding . . . implementation of projects of significant statewide impact should await the development of State plans.")<sup>2</sup>

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<sup>1</sup>Richard E. Rocchio and Eve Lee, *Planning for Environmental Education: The Nation's Experience 1970-73*, Center for Research and Education, Denver, Colorado, 1974.

<sup>2</sup>Department of Health, Education and Welfare, Office of Education, *Environmental Education Act (Public Law 91-516) Handbook on Preparing Proposals*, October 1971.

At the time of the Act, ten states already had their own environmental education planning programs under way. In most cases, efforts had been organized following a directive from the state legislature, the governor, or state department of education. Following the guidelines now set by the Federal Government, however, the workmanship involved in planning activities underwent a major change. Efforts shifted from the sole province of "professionals" to encompass a representative approach: Farmers, community organizers, businessmen and individual citizens, who previously had little or no say in planning for the environment, education, or other social change, joined the ecologists, educators, and government agencies as participants in the planning process.

Reflecting the demands built up in the 60's to consult with and utilize the energies of people whose destinies would be shaped by social action, planning for environmental education became a grass-roots operation in many states. Emphasis was now given to seeking the ideas and commitment of people at the community level and the groups they represented—in contrast to the traditional, more "elite" approach in which experts prescribe what the public should know and do. In a few instances, this change in perspective was seen as the natural way to begin planning for action in the 70's; more often it was the result of following the very specific directions within the government grant application.

In any event, the results of the questionnaire and the Estes Park Conference show that while initial decisions to launch statewide master plans most often fell to professional educators, more states were at least attempting to involve a substantial cross section of people than those who restricted planning efforts to a small group of specialists. In fact, the Conference participants expressed the belief that "environmental education is too important to be left to the educators." "Planning for Environmental Education" details some of the best of the approaches employed in gaining citizen participation.

A basic premise of education changed as well, adding non-formal efforts to the classroom-based approach and its traditional contents. Most of the history of education in America has been based on the belief that its purpose was to pass on to the present generation the knowledge and skills of the past, using a formal academic platform; less attention was paid to influencing life-styles by teaching practical applications of new value systems in a variety of educational settings. Following the Environmental Education Act, most state plans for environmental education included a variety of educational approaches. People had to be reached, be it through the formal classroom, the media, newsletters, speeches, audio-visual aids, public hearings, or information clearinghouses. Total community awareness projects were planned, using facilities in social action centers, parks, zoos, recreation and camping sites.

Thus both partners in the marriage, planning and education, moved from the premise of "ivory tower" control to more expansive, participative approaches. Professional environmentalists, whose perspectives on issues might be confined to their special field of interest; academics who advocated teaching the fundamentals of ecology before taking action; planners in state departments of education who defined learning as a classroom activity—all had to

confront the idea of admitting other points of view and allowing immediate participation of untrained, but highly concerned, groups and individuals.

There were some reservations about the participative process, needless to say, and some disagreement about the extent and use of broad-based representation. The arguments ranged from the fact that the democratic process can lead to excessive debate over a single issue and thus delay the establishment of concrete programs to the counter complaint that many times such representatives are involved on a token basis only.

In choosing participants for the planning effort—whether from education, the government, an environmental group, business, industry or individual citizens—the highest value was placed on the extent of personal contribution, rather than on the prestige and experience of the organization represented. For example, political non-partisanship, readiness to become fully involved, available time, and level of commitment were among the most important guidelines used for selecting key planning participants.

Most states utilized a specially appointed organization of citizens as their governing or advisory councils. Together with salaried and volunteer staffs they achieved a position of major responsibility within the state, with powers ranging from identifying problems and pinpointing objectives, to directing regional organizations, to writing and implementing the published master plans.

The importance of the cooperative working relationship between the citizen-based councils and professionals became evident throughout the planning procedure. Educators, government officials, and environmental groups were most often involved in both the planning process and in gaining approval for contents of the plans. Together, these groups acted as magnets for the most current and valuable information on environmental education needs; and by the end of the funding period almost every planning group stood at the head of its state's ecology movement, providing a solid base of direction and standard-setting to which all concerned groups and individuals could turn for guidance.

### **Goal: Flexibility to Meet Changing Needs**

In addition to the twelve states funded by the Act for planning, eleven others produced a master plan on their own and several others initiated planning efforts. These states looked to local grants and appropriations and in-kind resources. Whatever the source of funds, the planners' intentions were primarily to formalize a structure for implementing programs and to provide a framework for putting environmental education into perspective. Some states indicated as major goals the improvement of public awareness and motivation for action; a few hoped to influence legislation.

The documents resulting from the planning procedures were intended to serve as flexible guidelines, to be utilized by particular groups within the state to launch projects according to their circumstances. This use of the master plan as a guide which would meet changing situations and needs was considered far more important than publication of a rigid, finalized document. Such guidelines would include inventories of environmental and educational prob-

lems, available and potential resources, current efforts, and the identification of seats of power within the state.

States envisioned a procedure which would not only reduce conflicts over leadership and help the Federal Government respond to local needs, but one which would also be a learning process in itself. As people became involved in planning for environmental education, they would reach a new level of awareness and understanding; the participative scope of the effort would in fact result in an interdisciplinary power base of informed citizens poised for action.

### **Plans in Action**

Twenty-one states have published master plans as of this writing. While fourteen have put at least some aspect of programming into action and several others are nearing the stage of implementation, only three—New Jersey, Hawaii and Wisconsin—have been able to implement the bulk of their documents. With the number and variety of environmental education projects under way, no definitive statement can be made as to how many or which among them directly result from master planning. Programs in some states are clearly local attempts to solve specific environmental problems, and while they coincide with projected efforts in statewide master plans, they may have been undertaken on an independent basis. In fact, in most cases where states indicate plan implementation, the conclusion must be made that many of the programs would have begun even in the absence of state planning.

Projects recommended in the plans for implementation cover a wide range, with top priority in most instances being given to curriculum development for formal education, pre- and in-service teacher training, and information clearinghouses capable of servicing a cross section of the population.

During the course of time, federal government funding priorities dealing with separate provisions of the Act shifted. Planning grants issued during 1971 and 1972 were subsequently treated as pilot demonstration programs, and although individual projects received funds, no grants from the Environmental Education Act have been made available to individual states to help implement the overall program outlined in their master plans. (New Jersey's aid came from U.S. Office of Education Title III discretionary funds; Hawaii and Wisconsin received state support.)

Interestingly, a review of the published master plans reveals a rather unusual position for planners expecting federal assistance. Less than half the completed plans included any provision for funding the implementation phase. The others were cautious, adding in-kind services and local cash grants to envisioned government appropriations. Even the replies to the questionnaire indicated that only a moderate number of states believed that funding for implementation would be secured, and that less than half the amount of money sought was actually expected.

Realistically, of course, planning for environmental education should not have been undertaken with blind economic optimism: Obviously, the massive amounts of public funds once appropriated for social projects would not be made available in a decade whose catch-phrase was "economic priority"—no matter how popular the word "environmental" had become. Even at the opening gun, relatively small amounts were granted, and those who entered

the arena should have known they would not be able to accomplish all they wanted on a statewide level. In light of this, many did in fact bring with them a reserved and realistic economic view, with hopes of accomplishing whatever they could.

This is not to negate the fact that any real impact in environmental education is inextricably linked to funds, nor to deny the disappointment and frustration experienced by many who had given their energies to the long planning procedure, and then saw they could not launch the plans in their entirety. But against these realities, the perspective of honesty must be applied: No carpet was pulled from under the environmental education movement, because none had been placed there to begin with.

Most of the work of environmental education master planning, which brought so many new projects to the brink of fruition, appears to be lost; and without grant money to launch large-scale programs, any healthy upsurge in the field is doubtful. Yet if any one feeling pervades the environmental education movement at this time, it is the hopeful desire that the storehouse of energy, knowledge, and involvement can be utilized in some way to insure that three years of work do not become lost in a cloud of pessimism and procrastination.

### **Learning and Challenge**

Behind this hope lies the realization that, while the lack of tangible programmatic results of the planning effort is a major disappointment, the accomplishments of the past years demand respect. Had these planning efforts not been taken, our nation would remain at near zero-point as far as potential for environmental action is concerned, with a shameful and dangerous "awareness gap" between 1970 and '74. Instead, the planning effort perhaps proved to be the major social aspect of the entire ecology movement: Nowhere else have large numbers of people, from a cross section of society, been involved in actually defining the direction of action. Even without further implementation in sight, each individual and organization involved gained from the planning procedure a far more knowledgeable view of the way behavior and lifestyle affects the environment and what can be done about it. Everyone touched by the process in fact received a subtle but ultimately powerful dose of humanistic education.

Professionals in the environmental education field learned how to attract wide-scale public involvement, whereas previously they were unable or unwilling to encompass a participative approach. Though master plans are not now being used as complete documents, they remain useful guidelines to indicate who in the state can be called upon for participation and to provide an understanding of the way many disparate groups reached a new level of cooperation. The plans are, in effect, blueprints for a coming-together. They give tangible evidence of the changes in outlook among professionals, private citizens, business, and ecology organizations. In this way, an enormous amount of honest planning was accomplished—not with an eye toward money as reward for the effort—but starting from real concern, with the outcome uncertain.



These accomplishments take the environmental education movement full-circle to another period of challenge—but the starting point is on an entirely different level. In contrast to conditions in 1970, belief in the need for environmental education has now been proven, with a solid base of work-commitment behind it. The nation is now at a point where it must decide if behavior can in fact stem from this commitment, or whether action must only be tied to dollars.

The responsibility lies with each state to salvage at least some aspect of existing master plans in the absence of financial support. In some areas where implementation has begun on a small scale, educators and others have discovered that by examining their circumstances and exploring in-kind resources, sections of the master plan can in fact be isolated and utilized. Environmental organization personnel, agency-produced information material, ongoing training programs, and government-owned land sites have provided sufficient resources for bringing alive at least some master plan recommendations.

In the final analysis, the success of any master plan will be measured by the amount of environmental improvement resulting from its guidelines. To approach that goal, several states are beginning to use the experience of the past years to define priorities according to current resources and environmental conditions. The energy crisis has already begun to lead educators into a new area of concern—obviously the environment does not look to economics before affecting people's lives. Following this example by moving into a period of strong self-reliance, we can focus on the present and carve a practical direction for the future.

## Discussion

**DISCUSSION LEADER GRIFFITH:** All of us are aware of the environmental backlash that has occurred in the last couple of months which, I suppose, is part of the spin-off from the energy crunch. I would like to ask the speaker if he sees any way this discouraging situation could be turned around in a practical way, without using scare tactics, to our advantage.

**MR. ROCCHIO:** Well, it's difficult. We environmental educators have a lot of trouble communicating, too. Most of what I would call real environmental education—that is, a systems-based, multidisciplinary approach—predicted the fuel crisis a long time ago since it is a question of resource depletion and allocation, allocation being critical. We didn't understand, however, how thoroughly the government and industry regulated together, for nonecological and nonconservation means, the flow of this resource. And we could get into details about how they changed from sharing relationships with Saudi Arabia to asking Saudi Arabia to tax the oil companies so that the oil companies wouldn't have to pay taxes here and so that they could regulate in that way the flow of resources.

I am not casting a good or bad light on that. It is just that it is an economic reality. And environmentalists were saying, "It is economics; it is allocation; it is politics; it is need; it is materialism; and it is resources."

My answer to your question, in essence, is if we could really get a real environmental message across and stop looking at the narrow focusing about preserving or price controls or some of the kinds of things we hear related to this, we will have more success.

Secondly, I think the backlash is far less than anybody anticipated it would be.

**MS. ANNE KAUFMAN [Sierra Club]:** You talked about working with the Forest Service and the National Parks Service and other groups in coordinating. Do you work with the private groups such as the Sierra Club and some of the other environmental organizations?

**MR. ROCCHIO:** I think that we had the same results as David talked about, and it seems to me to be fairly universal. It seems that the interests of the Sierra Club and some

of the other organizations to this time have been to support education in a general way. But because of their lack of personnel and resources, they have been forced to continue to focus their energies and attention on the more narrow concerns of the membership, and in most cases, that tends not to be a kind of ecological systems base or even probably more oriented in the larger context in education. It is more toward getting some immediate problems solved now.

So there is work being done in almost every state in the organizations you described, but perhaps it has been limited, just to summarize, (a) because of people not seeing the potential for education as a means for helping to solve their more immediate problems and (b) the lack of resources and the need to focus on these more narrow concerns.

MR. MIKE HUDOBA: I hadn't intended to say anything during this conference. But as the first national writer on the subject of conservation, going back to the early forties, we have a history of over a hundred items of significant legislation passed by Congress, including conservation statements by Presidents going back to Truman. Being the only one on the national scene deeply involved in this in the days when conservation was a crackpot subject, when you talked to a legislator you had to explain to him what conservation was before you could feed him some story ideas to get back to the column.

In the course of this, as I listened to the various discussions, I heard a great deal about planning programs, and what I didn't hear as yet was a direct relating of the individual in the back yard, the direct relating to the individual who carries a fishing rod or a rifle, the direct relating to the individual who has some resource interest, and translating this directly to him as to how an environmental or conservation issue affects him.

We were substantially successful with a column, "Report from Washington" in *Sports Afield*, which started before a lot of you were born, pointing out to a fisherman that he doesn't go fishing in a polluted stream. This fact wasn't tied in until it was specifically brought to his attention. And the hunter on a barren, eroded, area which had no wildlife habitat in which to hunt.

So relating these items specifically to the individual and pointing out, in the course of this, how a particular item of legislation or how a particular program can improve or make better his hobby interests, his economic interests, his pocketbook interests, and the quality of his own personal life, is important. Still, regardless of all of the planning that goes on, you have to get to the individual, to get some dirt under the fingernails in this program of conservation.

We had a very substantial success, as I said, with over a hundred items of constructive legislation on the national scene. We have about all of the legislation that we need as far as a constructive environmental program goes. What we need is some bridge between the theories and the individual who is able to call his governor, call the state legislature, call the executive department, or through correspondence of one kind or another, and express a specific vote per individual kind of an interest.

MR. ROCCHIO: I support everything you said.

CHAIRMAN MULLENDORE: Thank you very much, Rich, for a very forceful and challenging presentation in charting some new directions as to how to go. And thanks to Mike Hudoba for trying to help us tie all this together.

# Agency Programs Improved Through Community Coordination

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*Change Agency*

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## **Introduction**

Wildlife managers work with natural environments as they find them, recognizing myriad interacting factors and recognizing the delicacy with which small modifications must be made to gain a benefit to their favor. When considering an agency's interaction with the public, it is important to recognize that the social environment is equally complex and that a delicate interaction of myriad factors maintains the social complexion and stability. We cannot successfully impose a program on the public which is incompatible with the existing social environment. It is also impossible to create a new program which is immune to the influence of the social environment around it.

An agency may want a public use program, an environmental education program, or to create a new public image. The program cannot serve the common public good by becoming an organic part of the social system unless we work with both the agency's knowledge and skills, and the community's values and goals.

The Bureau of Sport Fisheries and Wildlife is pairing its knowledge about the natural environment with what it has learned about community and education environments. The Bureau is putting a program into practice which makes most effective use of Bureau lands and experience, in combination with local community goals for education, to achieve better public understanding of the environment.

It has traditionally been the practice of most agencies to originate public activities and programs in isolation from community values and response. Such programs are not always incompatible, but by lack of communication and joint planning before the program goes into effect, the community and agency have not mutually accepted the relevance of the program to their respective values and goals. This then results in nothing on which to base predictions of future program success.

The problem is that, as individuals representing agencies, we are often unwilling or unable to accept that our ethical priorities are not necessarily those of the community. As individuals and as institutions we are reluctant to admit that ethical priorities change and that these changes depend, not so much on our personal and institutional decisions, as upon the often incomprehensible complexity of local and global human interactions. Therefore, it is obtusely naive to assume that a community will respond favorably to a wildlife or public use program simply because "I" or "my agency" think that the program is valuable.

Sometimes an admirable community leader will gather a following of loyal practitioners within a program. If the leader has not developed the program in response to local human wants and values, he will find that he, personally, is the saving grace of his followers and not the program he is proposing. His program will end as soon as he leaves.

As grand as it might be for the individual or agency ego, we are not in the business of selling personalities. We exist to establish program and for program to be stable and endure it must match people's values and response within the community.

Objective, informed analysis and comparison is as important for public programming as for land management. Community coordination is the process for seeking information about the community. This is a process to analyze and compare agency and community goals and values without excessive bias and misinterpretation.

Such input for programming allows more direct and efficient use of planning time; administrators have fewer unknowns to ponder. A better "fit" between agency program and community values makes a truer, better used and longer lasting service. A truer, more permanent program runs smoother and costs less because it requires less repair or revision.

## **Change Programs**

Community based programs can be of two types: those which provide services that are consistent with present public expectations; and those which seek a new way to serve the common good. New programs are change programs. They require a re-identification and rematching of values, expectations, and activities.

The Bureau is seeking new ways to support community education goals. Thus, we are dealing with the tactics and process of a change program within a community setting.

Three major operants are identified in most change programs: the authorizing agency; the representative agent, or coordinator, for the agency; and the target community. Characteristics and behavior of these three operants and their interaction for successful program development, as discussed in this paper, is based on the literature of community coordination and the development of the Environmental Education Program of the Regional Office of the Bureau of Sport Fisheries and Wildlife, Region 3.

## **The Agency**

An agency, especially a governmental agency, ultimately depends on the public for its support. At the same time, its function and reason for being is to provide service to the public.

Inevitably, an agency will attempt to influence the public and the public will attempt to influence the agency. In fact, each risks losing its advantages and privileges to the benefit of the other unless influence is exerted. This is the nature of a balanced social system and a balanced community.

Agencies usually represent authority in some given field. Such authority can justify change within a community, but it can rarely initiate it. We find that influence in the form of coercive pressure is not conducive to creating a

climate of cooperation. Without cooperation within a community, programs become extremely expensive to maintain and rarely achieve their intended goals. Even benevolent coercion by an impatient public agency will be an obstacle to creating a change program for the very reason that if coercion is necessary, it is obvious that the program is not compatible with the community structure of behavior.

An agency must know what its own objectives are before it can effectively interact with the community to accomplish some tangible end. However, agency goals and policy should not be so rigid that they will not accept modification to conform with the reality of the social environment.

A community must decide for itself what its needs are. Once this is decided, perhaps with the help of a coordinator, the community can be reassured that its decision to change its behavior is valid by the expression of agreement and support from the authoritative agency.

## **The Community**

### *Characteristics of the Community*

Social man gratifies his personal needs for food, shelter, sex, companionship, health, etc. by group interaction. Requirements for successful interaction between people are identified as group needs. These needs are summarized as follows:

1. For a similar orientation and thus a similar ground for communication, people need a consistent, coherent, internally reasonable system for operation.
2. People need to know what actions will gain reward and avoid disaster.
3. People need power to alter their conditions.
4. A social system of rights, duties, privileges and powers is needed to resolve conflicting and competing wants.
5. People need to believe in what they are trying to gain and in the way they are trying to gain it. They need to trust that others respect this belief.

Communities are formed to satisfy these group needs. Because these are often internally felt needs, the rationale for many community actions will not be obvious to the outsider. This is where confusion often occurs between the objectives of an agency intent upon a change program, and the objectives of the community.

An agency representative who is not a long-term participant in the local community will make action recommendations upon what he or his agency wants, and assume, a priori, that this is what the community wants. This rationale for action comes from outside the reasoning system of the community and the action may be inappropriate to the community objectives and behavior.

Many resource agencies complain that the public is apathetic to their quality public use programs. More likely these programs were designed without consideration of local wants and are, in reality, low on the priority list for community behavior.

In order to know the group mind within a community, some characteristics of communities must be known and an agent, the community coordinator, of the agency must make contact with the inner workings of community structure.

If program compatibility is to be insured, the community needs must be considered before agency objectives are formalized. Community needs can only be determined with confidence through the interaction of a sensitive coordinator and community members. This is considered in more detail later.

Often, agency programs can be simpler than might be expected, when looking at an inactive community from the outside. This is because communities usually have all the local ability necessary to achieve their own needs and objectives. The only deterrent to the expression of this ability is a lack of unity and cooperation or a strong belief in the validity of the goal. If this is the case, the existing community resources can be mobilized. The agency does not need to do the job for the community, but needs only to help secure the way.

### *Analyzing the Community*

A target community can be of many kinds and sizes. The characteristics defined in this paper apply generally to all kinds including rural, small town, inner city, suburban, state, interagency, or intra-agency. Wherever people interact, community can be defined, although some will be close-knit and others will be dispersed. Also, any defined community will have its unique structure, methods of operating and unique secondary characteristics.

Community actions of an agency are most usefully determined by examining the community forces for and against the desired goal. This force-field analysis, based on knowledge from community leaders and the interpretations of a perceptive coordinator, will present a pattern of helps and hindrances and enable selection of the most practical actions.

Community leaders have the best feel for what is appropriate in the local situation. They know what will and will not work, what will be suspect and what will be embraced, what will insult and what will encourage. They are best able to help determine the side effects—good and bad—of any action taken. The coordinator must therefore work in partnership with the leaders toward a mutual objective.

Leaders retain their position because they, above others, are keenly sensitive to the stabilizing and rewarding systems within the community. They know how to apply rewards and secure benefits in order to obtain a following of people.

However, community leaders must not be the only resource for a change program. The power and influence of the privileged is also needed to initiate and validate change. Each community has its own concept of who the privileged are, and there may be several categories. Generally the privileged are those who are least tied to the conventions and opinions of the community; they have already had most of their needs satisfied through wealth, authority, profession, religion, or personal life style. The respected privileged can set social examples for other people's behavior. Their endorsement or participation in change programs will speed or ensure acceptance. However, care must be taken that the privileged, with their power, cannot redirect the program for their personal benefit.

People's behavior is never easily changed. The familiar, proven operations are the easiest and least fearful. It is often better to establish change by introducing a new action, than to attempt to change or eliminate an old

practice which is considered valuable within the community structure. Substitution does not break the community structure.

New behavior or action to achieve community needs is therefore best tied to existing accepted programs. When activities are interrelated or fused with one another, they not only conserve community and personal energy, but lend mutual support to one another.

The perceived value in methods and results of programs is primarily determined by local community values and needs. However, the community is also influenced by its interaction with larger social entities. The coordinator must be aware of how the community relates to the state, to population changes, to commerce, to institutionalized education, to climate, to national policies, to his own agency, and to any other outside influences. All factors in combination determine the possible alternative actions to be taken toward helping achieve a community objective.

### **The Coordinator**

The coordinator is the intermediary between the agency and the community. Through his action of fusing the objectives of the agency and the community, a change program is created.

The attitude of a coordinator will make or break a program. The coordinator must be a secure person who does not need the approval of the community that he is working in, but yet has its best interests at heart. A coordinator who attempts to woo a community for his personal needs will not be perceptive to the needs around him. Besides, the community will be quick to detect his motivations, whether he is aware of them or not, and will have a low regard for his person and his program.

Because the community's reason for engaging in any action or program is intrinsic to its own structure, a coordinator risks rejection of his project, and of himself, if he attempts to explain his presence or his tactics on moralistic or ethical grounds. Being an outsider and representing an outside agency, it is more than likely that his moral and ethical rationale is not consistent with that of the community.

However, a practical explanation of tactics is likely to be accepted. The coordinator and the community will often agree on how to achieve an objective even though they disagree on why it is valuable to do so. It is not important for the final achievement of the common good that all have the same ethical reasons for working on a common activity. The community itself does not ask strict adherence to ethics; it only asks for consistently acceptable behavior. The coordinator therefore keeps quiet concerning his personal philosophies.

The coordinator will always be struggling to overcome his own professional and class stereotypes in his attempt to clearly understand the community. A coordinator often has a different education, is better paid, and more widely experienced than the norm of the community in which he is working. This will influence how he interprets other people's needs, problems, and abilities. Because he cannot hide what he is from the community, the community's concept of him and reaction to him will also influence what he sees. If he personally condemns what he sees, his program is lost.

The coordinator can never be truly part of the community and still do his

job. He must remain apart to remain objective and hold the agency's values on an equal level with those of the community. It is therefore essential that he honestly gain the confidence of, and work in partnership with local leaders. It is also important that he find an assistant who is a respected local citizen. This assistant coordinator can act as an interpreter of local mores and etiquette, and is a detector of subtle changes of attitude and behavior toward the tactics of the coordinator. Obviously, the coordinator and local assistant must be able to communicate clearly and freely.

First a coordinator must thoroughly know the characteristics of the target community. Then his tactics are based upon two general characteristics: (1) the community has the ability to solve its problems and reach its objectives if its people can work together; and (2) people and communities are sold on compatible change programs through their own arguments and involvement. The coordinator therefore lives up to his title by bringing like-minded people together to discover for themselves that it is possible and rewarding to accomplish what they already wanted.

Indirect leadership is most effective in enabling people to express their own needs and discover the action necessary to satisfy them. The coordinator uses the structure of the community to bring people together, but remains the outsider and lets the leaders take responsibility and credit for the action.

As an outsider the coordinator can remain objective, especially in applying the principle to never let action start until a community need is generally felt and expressed. To politely forestall premature, and possibly abortive action, a coordinator will insist upon group development of a detailed behavioral statement of the problem or task.

For a plan of action, tactics are deliberately selected for those activities which are most possible to achieve within the community structure. Short range, easily achievable goals are important for building confidence and interest at the beginning of any program. While agencies are noted for selecting program goals which take 50 years to accomplish, the span of an individual's unrewarded interest and commitment to even his own goals on a community level is six to eight months.

Models of action serve as the best communication to other people and communities. The coordinator finds that devoting all of his effort to a single good model of community action by a few people will influence more people to new behavior, than by spreading his efforts to all people at once. Besides being made more secure and lasting within its own community framework, other people will view the results of the model, and judge on their own ethical basis, how and why they will use the rewards of the same program.

The coordinator makes certain that the procedural outline for action within a change program is open and flexible enough that the process and results can be shaped by the participants. No program can be static and long provide for the common good. Unless evolution is allowed through input from the community, the program will soon become obsolete. The program will then be either ignored, rejected, or if still maintained, then for some objective other than that originally intended.

The best training for community coordination is in-service work in the community under the guidance of an experienced coordinator. The interaction skills and acquired insight are far too complex to be learned from a text.



The community coordinators's task is, in summary, to analyze the community and feed this information back to the agency. Once agency objectives are matched to community needs and wants, the coordinator helps to bring agency and community into a compatible working relationship. If this job is done successfully, the program will continue on its own momentum, and the coordinator is reassigned to another program or community.

## **The Agency**

### *Agency Use of the Coordinator*

In respect to community change programs, it is essential that the coordinator help determine agency policy for any agency action or non-action. Otherwise, there is no input of data and interpretation from the very entity that the agency wants to influence. Also, without the help of the coordinator the agency will have no first-hand information on how the community would like to influence the program.

Once policy and objectives have been established, a procedural plan of action should be developed which justifies all action in practical terms. This practical rationale for agency involvement in the community is the only expression that the agency coordinator will be able to communicate successfully and acceptably for the reasons stated earlier.

The agency will soon realize that the coordinator is torn between two sets of objectives. Until he can fuse the function of the agency with the function of the community, the coordinator must hold distinct in his mind both community-centered and agency-centered interests. Agency pressure on the coordinator to either accelerate community acceptance of the program, or expand his field of action, will inevitably force him into coercive practices which will sacrifice community respect and participation in the program. Stable and continuing community programs may take from one to fifteen or more years to build depending on their complexity.

Agency administrators are sometimes at odds with coordinators. The administrator, removed from the actual scene of operations, is under pressure to judge operations from the point of view of agency policy and the subsequent judgement of his superiors. The coordinator, dealing daily with the people in the community, constantly sees the community point of view. Often conflicts of viewpoint and interest between agency and community become conflicts between administrator and coordinator, each seeking to persuade the other of the rightness and practical necessity of his position.

In order to resolve differences between agency and community and still retain the best interests of both, the administrator and the coordinator must meet on equal ground. In most agencies, administrators are the superiors of coordinators and other field personnel. When this is the case, administrators win and coordinators lose in policy decisions. An administrator can simply order otherwise, withhold money, or transfer the coordinator to another location. Ward Goodenough (Goodenough, 1963) suggests that to "preserve the reasonable continuity of community coordination and a more equitable resolution of community-agency differences, field personnel and administrators be on an equal level of authority and responsibility."

What this indicates is that professional coordinators representing community program, and professional administrators representing agency objectives, need to cooperatively build agency policy for future community program involvement. If community coordination is thought of as a service to administrators, much agency efficiency and effectiveness is lost because the skill and insight of the coordinator is lost from planning.

This is not to say that an experienced coordinator is an administrator, nor that he should become one. The two roles and the professional qualifications of administrator and coordinator are distinct, but both are essential, so that the agency objectives can be met at the same time that community support is gained through meeting community wants and needs.

### *The BSF&W Community Based Environmental Education Program*

Three and one-half years have been spent testing models of community involvement in the use of BSF&W lands and resources for educational purposes. The philosophy and tactics of the program are demonstrated in a slide-tape documentation of a model program in the community near Horicon National Wildlife Refuge in Wisconsin. Model programs are also being developed at Sherburne Refuge in Minnesota, Upper Mississippi Refuge in Minnesota and Wisconsin, and Chautauqua Refuge in Illinois.

The program involves cooperative interaction with citizens, schools, civic organizations, colleges, state agencies, and other federal agencies. All cooperation and coordination is based on community organization theory and practice.

Model products such as teaching guides, brochures, handbooks, college course contents and plans for teacher workshops were prepared when no community resources were available for development. Development of products, communication methods and future program planning is being turned over to the state and local community as the mechanisms are established to handle this.

Further information on this program can be obtained by writing to:

Regional Supervisor  
Division of Land Management  
Bureau of Sport Fisheries and Wildlife  
Federal Building, Fort Snelling  
Twin Cities, Minnesota 55111  
Telephone: 612/725-3570

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## **Discussion**

DISCUSSION LEADER GRIFFITH: I would like to introduce Ed Landin. I would like for you folks to have a chance to meet him. This is Ed Landin who was the coordinator for this, the man behind this project working under contract with the Bureau of Sport Fisheries and Wildlife.

I think in looking at this presentation, the first thing that occurred to me was: What keeps a program, such as the one you described in your slides, going after the initial

organizational period? And do you have to keep that coordinator on board in a particular community for some certain length of time?

MR. LANDIN: As the slide-tape said, we call it institutionalizing and that's your term as you defined it in describing a program three years ago. It is a matter of finding those objectives and goals already established within various other organizations, institutions and within the community itself, and so aligning our own program of environmental education with those so that people do these functions normally with their own job goals, within their own value systems. What we try to do is bring the value systems and the objectives of various people and organizations together into some sort of a coordinated whole. When we can do that, then the ordinary function provides these people with work to continue on. In other words, they have successfully achieved the jobs that they were originally assigned to set out to do. What we are trying to do is to see that they can successfully achieve what they want. And if we can do that and have that in line with also what we want, then we have an established program. It takes a little while to set it up.

That coordinator, Katie, who was pictured in the show, worked in several communities at one time. You can only do so much at one time, let people digest that a little bit and work with it. They have to decide that it is their own. Then you go on, let that happen and you can come back at a later time and attempt to bring something else together.

Probably it will take four to five years of work with a community on an on-and-off basis before it becomes their program. When it is their program, just a little bit of help from there on in will keep it going.

DISCUSSION LEADER GRIFFITH: Do you visualize then that the community will then accept the role of employing a coordinator to replace Katie?

MR. LANDIN: I don't see why it is necessary with the organizations that are already there. For instance, if the college has an objective of educating teachers and if we can show them how they can educate teachers in such a way that the teachers will sign up for the course and pay tuition, they will have an ongoing program because the teachers will continue to do it. They will offer the right services to the community. Why do we need a coordinator to continue that function when it already operates?

MR. JIM MELAKOWSKY [Natural Science Review Foundation]: I would like to ask what commitment does the Bureau have to this program nationally regarding each of those respective refuge locations.

MR. LANDIN: There is a national policy statement which tends to be toward a commitment to environmental education. The actual style of the program, however, is tentative. They are examining our Region III program to see whether or not it might fit objectives nationally.

MR. MELAKOWSKY: So you would call this a representative prototype at the state level, would you?

MR. LANDIN: Yes. We have been experimenting for three years. This year we are actually trying to expand the program to see if it won't work in other areas. We have had several pilot areas in which we have been testing it out.

I might add though, there is some need for a coordinator-at-large, not the specific community coordinator, to get the job done. Somewhere, somebody has to have a handle on the program and know what is happening regionally, maybe subregionally, so that the various efforts of people, both within the Bureau and the people within the community and at the state level, can be brought together and we can define what is happening.

MR. MELAKOWSKY: How many coordinators are on the scene at present?

MR. LANDIN: There are three people assigned from the Bureau. Peggy is in charge of environmental education, plus other public use programs within the region. She works out of the regional office. There are two people assigned half-time in the field. Then under contract from the outside are myself and Katie whom you saw in the slides.

MS. GAYLE KAPALOSKI [National Audubon Society]: I was curious as to how you get teachers interested in coming to your workshops. So many of them have so many other things they are interested in. I was wondering if you offer them credit or how you get them to come.

MR. LANDIN: The more rewards you can offer people, the more ready they are going to be to assume the task. Not every teacher is interested in coming. We feel that there might be a 25 percent potential of people interested in this style of education. Mind you, I say it's a "style" of education. It's not a subject matter.

I guess we have to approach the school district in any way we can. Sometimes we go through administrators; sometimes we go directly to citizens or to the teachers to find out where the interest is and what will specifically satisfy their interest and try to tailor the program to their needs, not to what we want to push.

DISCUSSION LEADER GRIFFITH: I will ask Bill Mullendore to give us a summary.

CHAIRMAN MULLENDORE: I certainly don't propose to summarize what has gone on in the past three hours in the next ninety seconds. I will conclude, since we are running right up to the hour of noon, by thanking Chuck Griffith for his work with me in arranging the program and in conducting these sessions, all of the speakers, and the members of the Wildlife Management Institute staff who gave us technical assistance in arrangements and facilities, and finally those of you in the audience. I am sure that we have learned a great deal and will have a great many things to take home and think about.

**PART III**  
**Closing General Session**



# GENERAL SESSION

Wednesday Afternoon—April 3

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## Energy Developments and Ecosystem Management

*Chairman:*

GERALD W. THOMAS

President, New Mexico State University, Las Cruces

*Vice Chairman*

DAVID R. BROWER,

Friends of the Earth, San Francisco, California

## Remarks of the Chairman

Gerald W. Thomas

This is our last session of the Conference. We have a good program, excellent speakers, and I know you will be glad that you waited for this session.

Before proceeding, let me say that my cohort is David Brower. Almost all of you know him. He was, for seventeen years, Executive Vice President of the Sierra Club and is now President of Friends of the Earth at San Francisco.

Let us now look at energy developments and ecosystem management. Really two aspects of environment that should be kept in mind as we proceed with the program.

One is the absorptive capacity of the environment or problems of pollution. The environmental movement over the past six to seven years has focused really on pollution and the absorptive capacity of the environment.

Further, the recent emphasis on energy and the energy crisis has shifted back to the other aspect of the environment — the productive capacity of the environment, the ability of the environment to support people and other biological populations.

As you listen to these speeches this afternoon, I hope you will keep in mind that when we look at ecosystems, we not only have to look at the productive capacity of the environment but we likewise have to look at the absorptive capacity of the environment as more and more people populate this planet, earth.

# Criteria for Balancing Energy and Environmental Needs

Mrs. V. Crane Wright

*Colorado Open Space Council, President 1972-74;  
National Audubon Society, Member, Board of Directors*

## Introduction

My given title, "Criteria for Balancing Energy and Environmental Needs," would seem to be a fairly straightforward assignment. But in putting this title under the afternoon theme of "Energy Development and Ecosystem Management," I found it, in the vernacular of today, "inoperative" because:

Ecosystem management is the technique of harvesting nature's bounty without depleting the natural resource beyond the point where any member of the communities can regenerate and maintain itself over a period of time.

Balance as it pertains to ecosystem management is that dynamic status in which the diverse organisms of the communities maintain and reproduce themselves within a system of interdependency which favors no one species to the exclusion of others.

The natural ecosystem is complex and productive in terms of diversity. This diversity serves as a protection during the times of stress such as severe climatic conditions.

Fossil energy development as we know and practice it today harvests nature's bounty beyond the point where the natural ecosystem can regenerate and maintain itself.

Environmental balance as it pertains to development cannot be attained because it is that state where the diverse organisms cannot maintain and reproduce themselves, giving way to the dominance of the extractive intruder.

Extraction both depletes the resource it is dependent on and simplifies the surrounding ecosystem. For example, when attempts are made to revegetate with species that are accommodating to the altered conditions, the habitat reverts to an early successional stage. The number of niches and their diversity decreases and climatic fluctuations have more severe effects on the community.

If energy development is contrary to the principles of ecosystem management we cannot speak in terms of managing this industry by ecological means. If, by definition, "balance" would necessitate the dynamic state of co-equals we cannot put a dominating extractive industry into balance with the environment around it. We can, as we do, "consider" the environmental consequences of a particular energy development. But we cannot in truth speak of any term but mitigation. To "consider" other values means to simply acknowledge with no responsibility to that which is being considered. To "mitigate" is to make less severe, to temper; the environment gets mitigated, not energy development. By giving preferred status to the extraction of fossil energy, we negate the possibility of balancing the environmental needs of a particular area where fossil energy development has been introduced.



We can, however, re-order our priorities, if that is this nation's wish, and determine our goal to be "clean energy" in the true sense. We have it in our means to reach this goal. I wish to speak about criteria needed to accomplish this goal, and consequently I have subtitled my paper, "Criteria for Energy with Honor."

### **"Balance" and Interior's Oil Shale Program**

First, however, let me illustrate our present inability to balance energy development and environmental quality by using the Prototype Oil Shale Leasing Program as an example in point.

The program was designed by the Interior Department with balance as a stated objective. I quote: "To assure the environmental integrity of the affected area . . ." (Interior 1973). This objective was supported by President Nixon when he said, "A leasing program to develop our vast oil shale resources, provided that environmental questions can be satisfactorily resolved." (Nixon 1971)

In June of 1971 President Nixon made headlines by announcing the program and declaring oil shale to be a "clean energy source." (Nixon 1971) In a natural state, oil shale is clean and shale oil is low in sulfur. But the extraction of oil from the shale as it is proposed is a dirty business.

It was further announced in 1971 that this program was to be a "prototype." Prototype means experimental, a working model for testing new and innovative commercial technology. The knowledge gained from this initial infant model would dictate the decisions and conditions of expanded commercial development. However, the techniques to be used on the lease tracts are traditional underground and open-pit mining methods. There are no upper limits set for production from the tracts and no standards by which to judge the experiment. A lessor has already announced plans to exceed, by three times, the prototype production level. (Gulf-Amoco 1974) This program, by not adhering to the accepted definition, is prototype in name only.

At the same time, Secretary Morton announced that industry would conduct an exploratory core drilling program on the public lands to obtain oil shale resource information and environmental data, such as ground water conditions. This environmental data was to be made publicly available upon completion. However, John Rigg, Deputy Assistant Secretary of Interior, refused to release this hydrologic data when requested, redefining it as oil shale resource, not environmental information, which was proprietary to the companies.

The program began with Interior's selection of tracts from among those nominated by industry. The government men on the selection team had no environmental criteria, no guidelines for their selection decisions. Of the 20 tracts nominated by industry, a number were immediately eliminated because they would not square with industry's desires for maximum recoverable shale oil. None of the tracts was by-passed because of environmental considerations. Contrary to Interior's own assertion that it would not take state lands for this operation, (Interior 1971) Colorado tract C-a, which includes Division of Wildlife lands, was one of the selections. Industry's desires took precedence over prior commitments. Thus, from the beginning, Interior was biased toward development in this "balanced" program.

Let us look at specific areas where "balance" between development and environmental considerations were attempted in the oil shale program.

*Social Impacts.* The social impacts on the oil shale region are dictated by the needs of the oil shale industry. Industry will require workers and supportive offsite servicing facilities, and the workers will need community services such as roads, schools, sewer systems, police departments, hospitals and the staff to run all these—with the cost falling on the States and counties of the region. According to Interior the regional population is expected to increase 140 percent by 1981 in the prototype program and top 200 percent by 1985 for a one-million-barrels-a-day (b/d) industry. (Interior 1973) No figures which describe the tangible and intangible costs of development to the present and future residents are available.

*Offsite Impacts Associated with Oil Shale Development.* To support an oil shale industry, electric generation stations, four-lane highways, coal strip mines, dams and aqueducts, ancillary industry and perhaps even refining capacity will be developed in the region. Anticipated locally are expanded towns, trailer courts, tent cities, new cities and Colony towns. Other state and regional impacts could occur from oil pipelines, perhaps heated, transport of Canadian and Pacific Northwest water, desalinization plants, pumping saline ground water into Great Salt Lake, building refineries in Chicago and perhaps Los Angeles. Although these offsite impacts are estimated to have more long-range and long-distance adverse effects than the mine sites (COSC Mining Workshop 1972), Interior mentions some of these developments but neglects to discuss the impacts.

Requests for roads and facilities have already started to come in. States, counties and towns do not know what to realistically expect, how to plan, or where the money and help will come from. (United States Senate Hearings in Grand Junction, Colorado 1974)

*Air Pollution.* Interior is candid in saying that the air quality of the area will significantly deteriorate but goes on to conclude that industry will meet standards that have not yet been set with technology that does not yet exist. (Interior 1973)

Industrial research done in the area is no more promising. In a recent newspaper article an Atlantic-Richfield staff ecologist was quoted as saying, "To be really blunt, we haven't done anything about (this kind) of air pollution. . . . That's society's problem, not ours." (Duff 1973)

*Oil Shale Tailings.* Retorting of oil shale removes the oil and leaves black, talcum-powder-like shale tailings which expand about 1.5 times the original rock volume. This material has no nutrients, is salty and essentially sterile. About 70 percent of the tailings, or "spent shale," might be returned to the mine. The companies frankly said that they didn't want the expense of returning the tailings to the mine cavity. Interior yielded in its oil shale lease by accepting industry's plan to dump all these tailings in canyons as fill—a unique case of leveling our canyons from the bottom up. In a promotional slide show produced by Interior to sell the program to the public the text terms this dumping a "beneficial use of canyons."

The tailing-filled canyons will necessitate the building of dams and pump-back facilities at their base to minimize the amount of leached salts entering the waterways. The lease fails to address the possibility of dam failure and the industry's responsibilities, nor does it require the companies to make any provisions to maintain these dams in perpetuity.

Interior asserts that salts in the Colorado River will increase "only 10-15 mg/l." (Interior 1973) Dr. Glenn Weaver has calculated that at 99 percent effective control of tailings enough salts would leach from spent shale dumps alone to more than double Interior's estimates. (The Institute of Ecology 1973)

*Water.* The three-state oil shale region of Colorado, Utah and Wyoming is a semi-arid area where water is scarce. The annual rainfall ranges from five to fourteen inches. Interior assures us that there is enough water in the three-state area to support the production of up to one million barrels of oil per day; it does not disclose that water now necessary to farmers, ranchers, wildlife and existing communities must also be provided. Using this water in the amounts estimated as needed for a one-million-barrel-per-day industry would preempt the possibility for other uses of this water for now and in the future. In effect, this region's water supply will be committed for this single priority and other uses will be subjugated, reversing the existing priorities of an agricultural, recreational and wildlife area.

Comprehensive studies have not been made to determine the amount of available water for use in the oil shale development plans and to outline competing uses. Additionally, no less an authority than Dr. Luna Leopold stated that Interior did not have enough water quality or quantity information on which to base a decision to proceed with the program. (The Institute of Ecology 1973)

*Land Disturbance and Revegetation.* The oil shale lease states as a revegetation goal that the affected areas are to be revegetated to the original carrying capacity. This is based on hope, not facts. The Final Environmental Statement clearly points out that there will be destruction of vegetative habitat both from disturbed land and the spent shale dumps and that no technology exists that can guarantee their revegetation (Interior 1973).

The primary lease goal (equal productivity) is waived by the autocratic authority given the Mining Supervisor, an employee of the U.S. Geological Survey. If a company, in his opinion, tries but fails to revegetate, he can excuse that company from further responsibility (Interior 1973). As facetious as this may sound, there is nothing in the lease that would prevent the Mining Supervisor from deciding that black-topping an area is the best use. Reduced to its bare bones, the lease allows industry to do too little environmental reconstruction but discourages it from doing too much.

For the past four years environmental organizations have visited the revegetation experimental plots conducted by industry and by the State of Colorado. What we have seen is not encouraging—exotic plant species grown under conditions of fertilization, irrigation, hand care and prayer. There are no goals for the revegetative research; it is not stated whether revegetation is for stabilization of tailing piles, to support existing wildlife and agricultural grazing, or just to prove that disturbed arid areas can be made to green up. The experiments to date have leaned heavily on whether a given species can be

made to grow at all in the area, not whether it would fulfill a role in a natural community.

Atlantic-Richfield finds its own early results exciting (Thorne 1973). I can only equate that excitement to a similar one over a false pregnancy. The grass is there, the seedheads are there, but they have yet to reproduce. After regular irrigation is withdrawn, the natural climate cannot support these stands (Interior 1973).

As a specific, deer cannot survive on exotic grasses (reclamation plantings) but must have high-standing browse and cover. To date the browse and cover revegetation experiments have gone from hope to disillusionment. From a possibility of 22 native shrub species, four species were attempted for revegetation but none was successful in reproduction. The experimental grass species could be beneficial to other animals; however, revegetated lands cannot be grazed by wildlife and stock because the impact would be detrimental to the attempted growth (Interior 1971, 1972, 1973).

*Wildlife.* Oil shale country is semi-wilderness land rich in wildlife with common, rare and endangered species that are not only important to the ecological diversity of the area but also are vital to the long-range economy of the region. For example, the deer herds in the Colorado oil shale area have a population of about 146,000 (Colorado Division of Wildlife 1974). Interior has estimated that oil shale development will reduce the deer herds alone by a minimum of ten percent (Interior 1973). Wildlife experts in the state estimate the loss will be closer to 75-80 percent (National Audubon Society 1973).

The highest concentration of golden eagle nestings in Colorado is in this area with at least 50 nests. The population is about 1,000. The endangered bald eagle winters here and the peregrine falcon has confirmed nests in the Piceance Basin (Colorado Division of Wildlife 1974). Other animals living in the region include mountain lion, coyote, bear and, what are possibly rare in Colorado, the kit fox and ring-tailed cat. Chukar, three species of grouse, wintering ducks and geese, and rabbits comprise some of the hunted species. Very little work has been done on the numerous nongame species (Interior 1973).

The offsite developments, dams, power plants, powerlines, roads, urbanization and recreational impacts of an increased population are not related to the effects on wildlife in Interior's Final Environmental Statement (FES). The oil shale lease asks for "Fish and Wildlife Management Plans" on the mining tract but does not stipulate what these plans are to be used to accomplish.

Most of the wildlife types will be reduced; predators will decrease; stream and spring depletion will reduce riparian communities. Some species will be lost to the area entirely (Interior 1973, National Audubon Society 1973, The Institute of Ecology 1973).

Given these anticipated changes, the program does not address the means of decreasing this destruction, nor does it take a holistic cumulative view of impacts on wildlife.

### **The "Balance" Within Interior**

Since the decisions for these actions came from Interior, let's look for the balance of interests within the oil shale program decision-making level of

Interior. What do we find? A simple eco-community with scant diversity composed of geologists and mining engineers, *Homo interdustris*. Interior and the oil industry are noted for their ability to occupy each other's nests interchangeably. The change of command of those who designed the program illustrates their adaptability: John Whitaker, petroleum geologist, now Undersecretary of Interior, formerly an oil executive; Hollis Dole, geologist, heads Colony Development Operation, an oil shale consortium in which the principal company is Atlantic-Richfield, but was Assistant Secretary of Interior when the program was designed; John Rigg, mining geologist, Deputy Assistant Secretary, formerly a lobbyist for the Colorado Mining Association; Reid Stone, mining engineer, head of Interior's Oil Shale Task Force, formerly the Atlantic-Richfield head of western resource exploration.

Dole, Rigg and Stone are still on the National Petroleum Council, an industry group that "advises" the Secretary on oil policy. As such they were and are still advising Secretary Morton on oil shale matters (National Petroleum Council 1971). Industry and Government are not disparate in their views: Mr. Dole, at Arco, says that industry needs more incentives (Denver Post 1973), and Mr. Rigg, at Interior, tells congressional investigators that oil shale should be given away to industry with "deep subsidies" (Washington Post 1974).

There is not one ecologist, social scientist, wildlife expert or even a token biostitute at this decision-making level. Thus, from the beginning, Interior was constricted in an attempt toward balance because of the background and interests of the decision makers.

*The Oil Shale Lease.* The lack of a broad ecological base in Interior is reflected in the oil shale lease. There was promise that the lease would implement and enforce "economic and environmental standards" but such standards were never set. From the beginning of this program Interior's premise has been: "What is industry willing to pay?" not "What is our resource worth?"

Under lax lease terms Interior will credit development costs against 40 percent of the bonus bid. It will credit reclamation costs against royalties. It gave lease tracts with far more recoverable oil shale than is necessary to test a prototype plant, thus leaving the door open for industry to go to full-scale production. It underwrites industry for planning miscalculations and for complying with regulations and laws not yet enacted; and it may grant further "incentives" if industry claims "difficulties" in making a profit. It allows an all-powerful Mining Supervisor to waive environmental goals, and it will credit "extraordinary" environmental costs of over \$500,000 used for environmental reclamation against royalty payments (Interior 1973).

In view of the hidden subsidies credited to industry, we can call it what it is—putting the oil shale industry on the welfare roll and wrapping the gift with the covers of the Oil Shale Lease terms.

## **Criteria for Energy With Honor**

The oil shale program is a case in point and not unique in our energy development picture of today. We can, though, redetermine our goal to be energy production by ecologically acceptable means. To reach that goal of "clean energy" we must devise and perfect technology for energy development

that would meet two criteria: (1) develop recycling and (2) develop renewable energy.

(1) *Develop Social and Industrial Recycling.* Nature has used virtually closed systems for billions of years and the test of time has shown that it is efficient, functional, productive, diverse, and that it works. Closed systems have the following common characteristics: For base energy they utilize a renewable, constant energy source; they recycle all waste by-products; they devise energy cycling that promotes high energy efficiency at higher system (food chain) levels—this is, by definition, efficiency. Without further delay we need to emulate nature in this regard. We need to address ourselves to virtual closed systems to help alleviate the use-and-discard ethic that we are living under.

Relating this to the oil shale program we find that technology, known as the three-mineral industry, which held promise of some recycling and improved efficiency, was not even given a chance. It would extract by conventional methods up to the point of crushing the shale, but there the similarity ceases. The retorting and hydrogenation of the shale oil can be done in one step to produce high quality fuel oil; it extracts three minerals—oil shale, nahcolite and dawsonite—which so reduces the residual volume that the tailings can be returned to the mine cavity from which they came. The dawsonite, an aluminum mineral, could replace the supplies we now import. The added recovery of nahcolite would eliminate most of the salts from the water. There is a commercial market for nahcolite since it is used to eliminate pollutants from stack gasses (Interior, Superior Oil Testimony 1973). Interior by closing out smaller, perhaps more innovative, companies has locked us into development by the same methods—they opted for the familiar at the expense of efficiency.

During World War II this nation showed that we could recycle. And industry has done some exciting things. Recently we heard how Grumman Company met the energy crunch by recycling their computer heat to warm their offices. They not only saved energy, they saved money.

We see and hear of examples every day. It is not that we cannot attain a closed system, that we can do; but to do so we must open closed minds.

(2) *Develop Renewable Energy Sources.* Nature operates on a least work hypothesis. It utilizes renewable sources which are easy to get and stores the unused portion of this energy for later use. Plants are a good example in their utilization of solar energy.

So far the initiative in renewable energy areas has been taken on by individuals. News items about wind-generated electricity and the use of solar energy for partial heating and cooling are no longer a novelty. An inventor in New York is producing electricity from dead leaves and will use his compost piles to heat and light his six-room home. There are proponents of using chicken droppings for powering cars, which may not be too funny when you consider that the potential BTU's in one ton of manure equals over two tons of oil shale (Science 1972). Individuals seem more eager to experiment and find answers to these problems than the bureaucratic and industrial minds.

Enough sunlight falls on the United States in just two days to exceed in BTU's all the country's known reserves of oil, natural gas and coal (Conservation News 1973). Yet our national budget for 1975 allots 18 times more money to the Atomic Energy Commission than that for solar research. The economic

preference given to non-nuclear fossil fuels over solar is nine to one. In 1973 the AEC out-dollared solar by 120-1 (Science 1974). And solar research monies have a way of being impounded by this Administration.

Four years ago the National Academy of Science said that we should make an effort now to put our base industries on a renewable energy source. Obviously, with such a recommendation, they did not consider the task impossible. But our Government continues to provide funds for “conventional” means of energy out of proportion to that committed to research for solar energy, wind power, tidal or anything else that is termed “unconventional.”

These terms, by the way, perplex me. We speak of tearing up the earth and emitting toxicants into the air and water as “conventional” and term the ways of nature, things like sun, wind and tide, as “unconventional,” even exotic. Then this would mean that green plants are “unconventional”?

The technology for the use of renewable energy sources is within our grasp and capabilities. Yet we continue to cater to the development preferences of the energy cartels and provide for their wealth at the expense of the public. This does show the consistency of our priorities. Not only do we commit our development to conventional extraction, but we also commit our monies to an accelerated use of what is running out.

*Slow Down Energy Use and Conserve.* To attain these two criteria of recycling and renewable energy, we must continue to slow down energy use and to conserve as a necessary stop gap.

Although the United States has six percent of the world's population, we consume over forty percent of the world's energy. From 1961 to 1973 our population increased by 14 percent but our per capita consumption of energy went up 40 percent. This country was once genuinely blessed with abundance but we have come within sight of the end of abundance as this nation has historically known it. Still we are encouraged to perpetuate the myth of abundance by being led to believe that as a people we deserve to eat more, use more and waste more.

People have reacted positively to the conservation of energy. The thermostats are down, bike sales are up, car pools are functioning, and wool sales are increasing. Already individual reductions of energy use have been estimated at between 20 and 25 percent (Ford 1974). And at the height of the energy crisis, during the so-called environmental backlash, National Audubon Society, a conservation leader, increased its membership by 28 percent over any previous quarter in its history. Signs of concern are evident.

The energy industries do need incentives—stricter environmental laws. They also need a prod—enforcement of these laws.

To illustrate this let me recount a dinner conversation with a businessman. He started with, “Because of you environmentalists the new plant we are building will cost about \$4 million more.” My defensive reaction was that he was going to give me hell for ruining his livelihood. Much to my surprise and pleasure, he went on to say that the extra cost was more than worth the price and that he had no complaints. He just wanted to say, “Thanks.”

It seems that the environmental standards his industry had been opposing so hard for so long had become a fact of life for the chemical industry. Having to live with these restrictions made them look closer at their operation. They

evolved new technologies to meet the new standards. They were forced to recycle and clean up and found that what they had previously thrown away could be sold for profit. When it was cheaper to waste, they wasted. When waste became expensive, they produced by-products that were an economic benefit. He assured me that strict environmental standards can be good for business.

So, I contend that we need to establish a national goal: clean energy production. We need to encourage the energy industry's ability to be adaptive and to devise the technology for recycling by-products and using renewable energy sources for the energy base.

Our legislators must force industry to go the path of ecologically acceptable energy production by making environmental standards more restrictive, not more permissive. They ought to give our federal agencies the enforcement power to prod industry to be responsive to our goal. And, somehow, we have got to up-grade Interior's decision makers to respond to broad ecological interests, not just special interests. We can then move away from our present short-term solutions that Project Independence promises into a long-term solution which could be "Project Interdependence."

I would hope that at the Fiftieth North American Wildlife and Natural Resources Conference we would not have to still be defining "balancing energy and environmental needs." Of course, we may well be talking about, "Balancing Genocide and Environmental Needs," but, hopefully, we could say, "Energy production in 1985 by our conventional means—solar, tidal, wind—is compatible with ecological communities."

We *must* implement our criteria for clean energy *now*. Only in that way could we say at the Fiftieth North American that we have truly attained our goal: "energy with honor."

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## Discussion

MR. DAVE McCARGO [Denver]: You indicated that the energy industry and the Federal Government are feathering each other's nest. I am curious to know if you are aware that Mr. Russell Cameron, who is, as far as I know, the head of Cameron Engineering, one of the major consulting firms to the oil shale industry, is going to join the Federal Energy Office and, if so, I am curious as to your reaction.

MRS. WRIGHT: I had heard that and I would prefer not to state my reaction other than what I have already said — I think it proves the case. Thank you.

MR. BRISTOL [Atomic Energy Commission]: I just wanted to point out a possible fallacy in what is my interpretation of the idea that actual systems have been closed in their cycling for millions of years. This is only true with respect to manner and materials. Our natural systems have, in the past, operated and must continue to operate as open systems with respect to energy which, of course, is coming from the sun.

In some ways, one of the most disadvantageous things that could happen to us at this time would be to suddenly find an abundant source of cheap, clean energy, because this would put us in another issue or circumstance of worrying about a crisis in timber rather than energy.

MRS. WRIGHT: I am not sure I understand what you are saying.

MR. RUTHERFORD [Chicago]: We have been complaining about industry, saying they are the bad guys. Insofar as alternative energy sources you mentioned are concerned, so far they are identical with the ones we considered in 1970. On the other hand none could supply more than two percent of our current energy needs, even if we were to develop the geothermal and other energy sources to total capacity in this country. However, we don't have the technology in this country right now for utilizing this power of the sun.

I would like to see a viable alternative to the problems we have with energy. We need energy and we have to balance it. Therefore, we cannot go just one way. Perhaps you would like to comment on that.

MRS. WRIGHT: I commend you for speaking out. Now, I wish we had started this alternate type of work a number of years ago. Perhaps then we would not be where we are.

# Meeting Energy and Environmental Needs: Industry's Views

T. F. Bradshaw

*President, Atlantic Richfield Company  
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I am here under false pretenses, in relation to giving the views of industry.

I have no franchise to speak for industry and, as a matter of fact, a very tenuous franchise to speak for my own company. There are many views in industry, and I don't think you can conglomerate them into any single point of view.

However, I do have some points of view. I feel some of them very strongly. They differ at times from those of my compatriots in business, and even my own company's views are sometimes quite different. They are not always claimed by industry and, certainly, they are not always acclaimed by industry.

For instance, back in 1971, we came out very strongly for utilizing the Highway Trust Fund for mass transit purposes. This was not a popular move in those days, particularly in industry circles, and it is still not, at least in some degree.

Last year our company came out with a strong statement favoring the demise of percentage depletion, and this did not arouse enthusiasm in the larger areas of the oil business, particularly among the independents.

As a matter of fact, I don't know who favored this position with us except perhaps Senator Proxmire, and it is the first time he and I have stood together on anything.

There is a bill in the House Ways and Means Committee which will phase out depletion allowance within a three-year period. For the past year and for the rest of this year, I am going to be doing a lot of talking on a theme which I would call "invite the government in." Basically it is that we must have a national energy policy. It must be a policy of the people to their government.

Energy, as a matter of fact, has become too important to be left in the hands of oil companies, just the same as wars have become too important to leave to the generals.

Now, this does not mean that I believe that oil companies should not continue to explore for and develop forms of energy. I do. I do believe in the private enterprise system, but I believe that we have come to the point where the Federal Government, representing the wishes of the people, must take responsibility for overall policy of energy development in the United States.

Now, this is not, at the moment, a very popular view among some industry sources. In fact, it is considered somewhat heretical.

That does not mean that I agree with all of the energy pronouncements that have come out of Washington in the last year and, further, it doesn't mean I agree with all of the energy legislation which has been passed or even all the

environmental legislation which has been passed. Some of it, in my opinion, is downright silly. However, we need legislation — we need good, sound legislation recognizing the need for energy policy and environmental improvement, and our company is doing what it can to help.

Now, you may think that when an oil company helps it means that it puts its massive lobby in Washington to work in its own interest. Our lobby consists of two people. We ran our lobby in Washington with one person for many years and then, as this thing got somewhat out of control this past year, we doubled our force in Washington.

I happen to believe very strongly that what is good for America is good for the Atlantic Richfield Company. We have come a long way from the days of Charlie Wilson, who said that what is good for General Motors is good for the United States. Further, if what is good for the United States is not good for Atlantic Richfield, then Atlantic Richfield will go out of business and should.

We did not give much thought to environment some ten years ago, any more than you gave much thought to the energy crisis ten years ago. However, we have been thinking about it for at least ten years but it takes dramatic events, generally, to bring people to a realization of a crisis which is long in building up.

For example, it took the Watts riots to bring me and my company to realize that the Blacks needed a place in America and had been shabbily treated.

Further, it took Santa Barbara to bring many people to realize that we were running out of time to save our aquatic resources and, further, it has taken the Arab embargo to bring people to the recognition that we have in our land an energy crisis which complicates all other social and environmental problems.

I think now there is an energy consciousness. When people turn on the electric light switch, they think, which is something I am sure they did not do before. In the past, when they turned that switch, they knew there would be light. However, when they turned on that switch today, they think, in addition, about some of the problems arising from putting the foreign policy of this nation into the hands of volatile Arab countries.

Some people, I am sure, think of the vast foreign oil monopoly. Some think about the problem of running out of energy and of creating an ethic within the United States of using less energy.

Therefore, we now realize there is an energy consciousness and even companies have learned that in order to survive, they must at least learn to play their part in the social and political development of the nation.

Back in 1953, for example, a certain automobile company had this to say: "Although automobile engines produce exhaust gases, these vapors are dissipated in the atmosphere quickly and do not present an air pollution problem."

That was in 1953. Since that time, we have all had an opportunity to develop familiarity with those vapors, and we know that they do not dissipate in the air. As a matter of fact, both you and I know that they poison the air with hydrocarbons and combine with sunlight to create smog.

This same auto company, for the past five years, has spent \$360 million on the control of auto emissions and now has 4600 engineers working on that problem. Companies do learn.

The problem of air pollution is still extremely severe. In Los Angeles, where I live, it is severe and, for different reasons, it is also severe here in Denver.

I believe, of course, that the problem can be licked if we learn and if we apply the results of our learning. The only solution we have in Los Angeles today, for instance, is the solution brought to us by the EPA a few months ago, which was to reduce the consumption of gasoline by 85 percent for nine months of the year. That is a solution but the people of southern California don't want that.

Most of our solutions are based on the long term. I am beginning to learn about that, since I am the Chairman of the Citizens Committee for Rapid Transit in Los Angeles. I have been reading a book which I recommend because it is both amusing and interesting. It is called *How to Get to the Future Before It Gets to You*.

The author observes that human beings have already learned how to come within fifty years of destroying a planet. Learning how to transform it into a very pleasant and permanent place to live, however, may take a little longer but we certainly have the power and brains to do it. If we want to really make something superb out of this planet, there is nothing whatever that can stop us.

We at Atlantic Richfield have been learning, hopefully not too late, but our learning process started in relation to our bitter experience in Alaska, where we found, in 1968, some large oil deposits. Our Executive Committee, at its meeting of that year, made all the plans to bring that oil down to the West Coast of the United States by 1972. However, we overlooked one thing, that we had discovered the oil in one era — the pre-environmental era — but had to develop it and transport it in another era — the environmental era.

We learned at very great cost — first of all, at very large cost to the nation. Instead of getting delivery in 1972, today we feel we will not get delivery on that oil until 1978. *Now*, if we had had that oil, perhaps we would have had a few cards to play with the Arabs and, perhaps, in turn, we would not have had the panicky reaction we experienced when the Arabs put their embargo on us.

Perhaps we would also know how much oil there is in Alaska. At the moment we don't know, because as soon as the pipeline project was stopped, all exploration stopped too. We know there are ten billion barrels there. However, we don't know whether there are twenty, thirty or fifty billion barrels because we haven't done the necessary exploration.

If we knew at the time we were dealing with the Arab nations that we not only had thirty billion barrels but had another thirty billion barrels in reserve, we would have had a firmer base on which to rest our foreign policy.

This learning process has also cost our company something — though we did learn how to build a safer pipeline, an environmentally safe line, at least to our knowledge of today's technology.

The line is going to cost \$4.5 billion, compared with original estimates of about \$1 billion. Now, in many places, inflation has already had a lot to do with this. Bad initial forecasting likewise has had a lot to do with it. Environmental protection has had quite a bit to do with it also.

We have also learned something about environmental impact statements and our first environmental impact statement, which was the first major one ever to be issued, I believe, under the new EPA Act — was a disaster. We knew nothing about environmental impact statistics and neither did the government and, as a result, it only consisted of a couple of pages and, therefore, was not

adequate. However, eventually we did produce an environmental impact statement which consisted of some 26 volumes. We now think it is adequate. However, there are still those who think it is not.

I don't know how much we have learned from this situation which we, in turn, can carry on elsewhere. However, because we still don't know what is expected of us relative to environmental impact statements, we don't know what is going to happen.

In this connection, we did get to know the environmentalists, first in connection with our legal briefs, and then in connection with their legal briefs, and then we also got to know them through various kinds of conferences — got to know them in a friendly fashion. We even had a group of them visit with us in Alaska for several days. We came to know that we wanted the same objectives that they wanted — namely, a planet that will sustain natural life of all kinds. We do not want to devastate this planet. We want a place where we can live with a reasonable quality of life and where our children can live with a reasonable quality of life.

We may have somewhat different points of view of how fast we can achieve economic growth and achieve environmental protection but, nevertheless, we have the same objectives.

We have, for example, been instrumental in setting up a group of environmentalists who will oversee the building of the pipeline. This is being handled through the good offices of the Arctic Institute.

This doesn't have to be done but we want very much to have environmentalists on the ground, on the site, as the pipeline is being built.

Therefore, there will be a seven-member council, each member drawn from a different environmental organization. They will visit the fields, watch the pipeline being built, and they will stay on for a few years after it is built so that they can observe the way in which it is operated. Further, they will make reports to their own organizations and to the public.

Of course, there is a certain amount of risk that we could become involved in further disagreements and squabbles, leading to further delays. However, I think that the gains will far outweigh the disadvantages. It will provide a continued dialogue in this most important of areas, which is an attempt to try to find some way of measuring the benefits of economic progress and environmental protection in each project so that we can make our trade-offs in a responsible way in each project. We do not know how to do that as yet but if we keep up the dialogue, we will learn how to do it eventually.

How do we get on with the job — how do we continue to get the kind of industrial and economic growth that is essential for the health of this nation and the health of the world and, at the same time, obtain environmental improvement which is so essential for the health and sanity of this globe?

It has to be done bit by bit and stage by stage and project by project. We are involved in another project just 200 miles west of here, in the Rio Blanco Valley, the Colony Shale Development. Shale is now commercial, at least from a business point of view. However, it is also needed from the point of view of the nation.

If we are to have a reasonable balance so that we are not beholden to the Arabs by 1975, as we are beholden to them today, then shale must take its place

alongside of coal, oil, gas, nuclear energy and all of the exotics which we do not yet know how to put to work.

The major issue appears to be what to do with this kind of spent shale. We have done a lot of experimentation — mulching, fertilization, and irrigation — and our opinion and that of a number of disinterested observers, is that the spent shale can be put into ravines and bear grass which can be used for browsing.

We can't know all of these things until the actual plant is built but, on the other hand, we think, from an experimental point of view, the chips are all in.

We expect to have a plant by 1978, a 50,000-barrel-a-day plant. We have invested thus far some \$30 million, of which about \$3 million has been devoted to environmental considerations and experiments.

We are spending about a million and a half dollars a month on engineering. The plant itself will cost from \$300 million to \$400 million.

Obviously, to get any impact in relation to shale on the Western Slope of Colorado, you cannot just look at that one 50,000-barrel-a-day plant. We have to look at what it will look like when there is a shale industry of a million barrels a day by 1985.

Now, here, we come not only into the normal kinds of environmental and ecological experiments and studies that we have become used to in connection with the Alaskan learning process, but we likewise come into a new arena — an arena of sociological impact in a new era.

If you will envisage the Western Slope in 1985 with a one-million-barrel-a-day shale industry, obviously, there will be vast changes in the three counties in this area, which today have a population of about 80,000 and which are projected, by 1985, to have a population of probably 300,000. This, in turn, is going to mean that they are going to need a political structure; they will need towns, water supplies, sewage, police; and, further, these towns will have to be built from scratch. As a result of these plans, we have brought in urban planners. We have talked with a lot of university people because we do not in any way want to become involved in a company town.

On the other hand, we do not want a totally unplanned development. We do not, for example, want trailer camps because this will come back on us and, besides, that is no way to develop the United States.

Somewhere in between lies the answer.

We don't know quite how to get there. We have started, however, by purchasing enough property so that a town can be built and we have, as I said, brought in urban planners and we intend to disassociate ourselves, as soon as possible, from that effort.

I have set before you some assertions about shale development in this part of the country but I have certainly not given you any detailed documentation. I have not proven any points that I have made. However I have stated that, in my opinion, the development of a one-million-barrel-a-day shale industry will not devastate the Western Slope ecologically or environmentally and it will not bring upon this area a maze of sociological horrors — providing, of course, that planning is well done and well carried out.

I would ask you, however, those of you who are interested, to sift the evidence. I would suggest you attend a one-day meeting which Colony is

holding at the Colorado Women's College in Denver on April 19th. It is an environmental symposium on oil shale. There will also be a number of workshops devoted to air, impact on air, water, landform, soils, vegetation, wildlife, scenic and recreational resources, all of which, of course, impact on the sociological aspect that I am speaking of. There are some pamphlets, pertaining to this, available and I hope you will look at them and I hope that as many of you as possible will come to that meeting because, obviously, there is not time here today to back up any one of these single statements with the kinds of facts that we do have available.

Therefore, I believe that heavy industry is coming to rural Colorado. I don't think that in the long run we can leave billions of barrels of oil in the ground, any more than, for example, we can leave food in the ground when people are hungry. Therefore, the oil will be taken and the oil will be used and the problems will be as to when and how. I hope the answer will be "soon," and I know the answer to "how" will be "well done."

## Discussion

MR. STEVE CAMPBELL [Denver]: I would like to mention the fact that a speech made by Robert Anderson, presented to the United States National Commission to UNESCO, bears on this. His speech was entitled "Man and His Environment" and in it he said that if he were running for political office now, he would probably be running on environment himself. If you were running for office, would you also be running on political convictions in relation to environment and, in that connection, if you were, which of the top five issues would you be running on and why?

MR. BRADSHAW: I cannot answer that question and, obviously, that is the reason I am not running for political office. However, if I were running for political office, I would first be running on a platform of honesty in government.

My second platform would be pretty much what has come through in the talk that I gave to you today — that is, that we must seek a way of reconciling environmental protection with economic growth and with a quality of life of which we can be proud. I don't know the answers to that and so, again, that is why I am not running for office.

MRS. V. C. WRIGHT: I just want to clarify what Mr. Bradshaw said. You were talking about oil shale. In this connection, would you be talking about the in situ process, the three mineral industries, or just about Colony?

MR. BRADSHAW: It would be the Colony venture only.

AUDIENCE: Who is going to be choosing the mine supervisor and what will be his qualifications?

MR. BRADSHAW: Mining is in the hands of one of our partners, the Cleveland Cliffs Company, which has been involved in mining for some seventy-five years or more. As to your specific question, who is going to choose the supervisor, I don't know the answer.

MRS. WRIGHT: Perhaps I can answer that by saying that the mining supervisor for the prototype oil shale program is an employee of the U.S. Geological Survey in the Department of the Interior. That agency will be choosing him. They have a great deal of authority. As to how this will be done, I don't know.

MR. JOHN FRANSON [Austin, Texas]: There was a methodology of reasoning that Plato once used and that was that if he could start you off with a certain platitude and get you to say "yes" to that, then he could prove almost any course of reasoning he desired to prove.

The course of reasoning here, it seems to me, is that if we can start saying "yes" to oil shale, that is one thing. On the other hand, I am not convinced we need the oil shale and I think the platitude has to be explored.

However, I was pleased to note recently in some articles in *Time* Magazine and other places that the Shell Oil Company and others had begun investigating other sources of energy, such as solar energy and geothermal energy. I would like to know to what extent

Atlantic Richfield and other companies are devoting their efforts to developing new sources of energy rather than to the platitude of oil shale?

MR. BRADSHAW: The first problem is to provide the United States and the world with energy for the next fifteen years or so without becoming totally involved with Arab politics.

There is not one of the so-called exotic fuels, solar energy, geothermal energy, which can be brought into play, in our opinion, in fifteen years. In fact, I would say the time factor would be thirty years. Therefore, we have to concentrate our efforts on what you might consider the near-term — the next fifteen to twenty-five years. The only thing we know how to do in that period of time is to drill wells, liquify coal, gassify coal or mine coal, extract oil from oil shale, or process the tar sands of Canada. These are things we know how to do and in which we have thoroughly advanced technology. They are things we know how to do during this particular period of time.

As to whether my company is involved in solar research or in geothermal research, the answer to that is "no." Further, I don't think we should be. I don't see how we can take the money of our shareholders and put hundreds of millions of dollars into play for a breakthrough in any one of these major sources, such as solar energy, fusion, breeder reactors or any one of the major sources along this line, especially investing the amount that will be required before we can expect any return and no revenue for thirty to forty years. There is no economic justification for an individual company such as ours to do that.

In turn, this will mean that somebody else will have to do it because it has to be done. Therefore, I think the Federal Government must do it. We firmly support the \$20 billion bill which is before the House and the Senate now for that kind of research. It should be done by the Federal Government, utilizing universities and some of the industrial establishments over the United States.



# The Energy Crisis In Perspective: The Public's Views

S. David Freeman

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We live with the result of decades of neglect. We have neglected our environment, we have neglected the research and development of renewable resources of energy and the nonrenewable as well. Everything except the atom, has been left out of the research and development picture for so long that it makes your heart break.

We have neglected efficiency in energy-consuming devices. Detroit has been as thoughtless in relation to miles per gallon as the average architect who fell in love with glass about two decades ago. As a result, we now have a glass society that is sealed in, with energy attempting to heat the outdoors in winter and cool the outdoors in summer.

We are stuck with all this. There is little we can do about the kind of machines we already own, the buildings we live in, and the plants we are trying to operate. We are a nation of energy gluttons, and I think it was our good fortune that the Arab nations gave us a painful enough lesson in the last four to five months that at long last we recognize it.

The great danger is, however, that the whole country is going back to sleep.

We have been told, for example, by our leaders, that the back of the crisis has been broken. People are driving faster than they did a few weeks ago. There are more cars on the street everyday. People are relaxed. America is going back to sleep.

The energy crisis came very quickly and left us just as quickly. My own taxi cab polls suggest to me that at least forty to fifty percent of the people think it is a gigantic hoax perpetuated by oil companies to jack up the price of oil. Actually, the price of oil has been jacked up in the Middle East where the cartels of nations have fixed prices. Oil prices in the U.S. too are now at these gigantic levels, thus, in turn, pulling other prices up with them.

We are in a new era—a new era of high prices and scarcity and the energy world, in my view, will never be the same again.

The great danger is that this country will think it is the same and go back to the growth pattern that will inevitably take us to the most serious kind of energy crisis that cannot be erased for decades.

What it will do, if we are not careful—and this is a serious problem to everyone—is destroy our most basic resources. Energy and environment are really two sides of the same coin. Unless we develop a national energy policy, we will never be able to implement the environmental goals that we have set for ourselves. We will always be just one year away. We will have destroyed that much more of our planet in the meantime.

The energy problem is one of the most vexing, most fundamental problems facing people on this planet because it raises a horrible clash of values and conflict of goals. This is where it all comes together. We either put together a policy for our nation and the rest of the world that is in harmony with our planet or we will eventually destroy our planet.

We have to develop a policy that will give us an adequate, reliable supply of energy, to fit the kind of civilization we have built for ourselves. There is nobody in this room who is for cold houses, stopping factories, and junking everything we now own. We are stuck with the present rolling stock of equipment and this has to be fueled. At the same time, we dare not run away from environmental protection. We have been trying hard to protect the environment for the last three or four years but I think environmentalism is losing the race.

Despite all the glib talk about progress in relation to the environment, the air is just as polluted, by and large, as it was three years ago; the waterways of our nation are just as dirty as they were, and more and more land is being turned over to development and not necessarily in an environmentally sound way.

Therefore, the news is really a bit more grim than generally pictured.

We still have as an objective the attainment of energy at the lowest real cost to society. When the price of energy escalates the way it has, it represents a real hardship to a lot of people who cannot pass the cost on. The ultimate consumer eventually has to swallow the additional costs. People who are in the taxicab business and in public service, who are not in businesses where they can charge more for their product, must provide deteriorated service.

The president of a university wrote me that his fuel bill went up \$1 million in 1974 and education, therefore, is going to suffer on his campus as a result. There is no way that he can make that up.

We must understand that we have to pay the price of the full cost of energy, but let's not kid ourselves. The kind of rapid escalation in prices that we are encountering is contrary to the goals that we have had in energy policy for decades. In addition, we have as a goal of energy policy, to free ourselves to operate in the world at large without having to worry about where our energy is coming from.

We have the problem of Arab leverage. Those goals—consumer and environmental protection, adequate supplies and foreign policy—are in headlong collision in many areas. It is my judgment that we really cannot do much in the next couple of years other than make do without using as much energy as we would like. It is a bit of a joke to picture an energy crisis as having come and gone like a big hurricane. But the Arab situation really telescoped the future. If the nation thinks it can go back to the growth pattern that we have had in the last few years—zero growth in energy production and about 4 percent growth in consumption, this, in my view, will be compromising one of our major objectives of foreign policy, namely, freedom to make peace in the Middle East. In addition, imported oil has an environmental price tag that is real.

Therefore, we need to face a fairly bleak period in the next two to four years, which is going to involve an effort to get by with less energy than we have been accustomed to. Further, unless we do that, we are going to go back to dependency on imported oil.

There is a great danger in this kind of environment of panicking, of grabbing every supply option for the future that is offered.

In the situation that exists today and which has existed in the last few months, there is no source of energy that could be offered to the American people that would not look attractive. But, if we look at the options we have for future years, the choices are much brighter and broader than are generally accepted. However, if we make long-term decisions to go for rapid development of every source of energy that is available—if we make an all-out effort to develop the outer continental shelf with the ten million acres of leasing suggested for 1975, a ten-fold increase over this year; if we make an all-out effort to develop the Rocky Mountain shale and coal; if we make an all-out effort for nuclear power options and, at the same time, increase our dependency on imports, we have decided on a historical growth policy. We have decided that the country, in the next five to ten years, is going to be a bigger and larger version of what it is today, with the same patterns of consumption.

This is an option that the country has. It is one we are most likely to follow because it is the path of least resistance. It does not require us, for example, to change our living habits, does not require the kinds of actions on the consumption side that are inherent in moving in a different direction. But it is the road to a real energy crisis.

Our analysis suggests that we do have other options. The country could move on what I call an energy conservation pattern which, if you take the year 2,000, would be the difference between using 185 quadrillion BTU and 115 quadrillion BTU.

It is our judgment that this country could get by in the year 2000 with two-thirds of the energy requirements generally projected with the 3.4 percent rate of growth. However, it will come about only if this nation, as a part of its energy policy, makes a commitment to energy conservation that goes beyond appeals to patriotism of individual householders.

It would involve, as a matter of fact, this country deciding to make large investments that will conserve energy.

The energy conservation option means that mass transit is going to have to be fought for by more than just a few people. When it is being fought for by enough people, it eventually becomes a reality. Then, in turn, we can start putting money into bigger cars called "buses," something which people can ride to work in with one-third the BTU per passenger mile as in the kinds of cars that a lot of people are riding in today.

If you were to ask the Federal Government how many buses it had on order today you would get an answer that gives you some idea of the weak push that has been made for conservation in the real sense of the word. Conservation means building bicycle paths in all metropolitan centers so that the 30 million bicycles bought in the last two years could be ridden and used more. It means planning future growth of our metropolitan centers so that people will have housing closer to where they work.

Continuing to grow for many more years in larger and larger concentric circles around the metropolitan centers is no way to implement a conservation-oriented policy. We are building a huge waste of energy into our lives. Conservation is going to require that our architectural profession and building industry get together—there are going to have to be building codes

and standards established, something more than just the market place because the people who pay the bills usually do not have a voice in the decisions of how the buildings are built.

It is going to mean pricing energy on a full cost basis to society. This is going to be hard to take, especially for people in the Tennessee Valley, where I grew up, where we had very low-priced energy. It is going to take a complete change in our thinking about how to produce energy and, further, it is going to mean pollution taxes so that the cost to society of damaging the environment is incorporated in the price of the energy. This money should not go to the oil companies but to the Federal Treasury to finance the investments that are needed to achieve a waste-free pattern of growth.

On this basis, we should be able to buy time to develop renewable resources of energy that otherwise would not be available. For example we have talked about solar energy in 1970, we talked about it again in 1974, and we can talk about it in 1978, and yet the \$20 billion bill that is being put through the Congress contains just a few "nickels" for solar energy. Unless the people of this country get excited about the kind of research in the Federal Government program, money will go for other fossil fuels and atomic energy. Who is speaking up for the sun in this country?

I ask that question somewhat painfully because, certainly, when it comes to research and development, we don't have spokesmen for that far-off renewable source of energy. I do not expect the oil industry nor expect the coal industry nor any other industries that have responsibilities to stockholders to make these kinds of investments. However, I do expect our government to be responsive to the needs of the people. Our report likewise suggests that there is no single villain in this energy melodrama—we just stumbled into this mess blindfolded as a society. However, I think that after the lessons we have learned in the last few months, surely we must now be awake and government's responsibility is to respond to the aroused electorate.

That, essentially, is the question before the House.

## Discussion

MR. ED MONTGOMERY [Denver]: According to newspaper articles in relation to your report, there was some discussion of the use of federally owned energy resources to implement a national energy policy. I wasn't sure exactly what that amounted to. I wonder if you could discuss that.

MR. FREEMAN: We have a major study of that particular question that will be released later in the summer.

We feel the federal domain is one of the most important areas because most of the resources that are available for development in the next decade or two are on the public domain. Thus far, speaking personally, I would have to give the Interior Department a very low grade for their work in acting as the custodian for the people.

They have exhibited an interest in only one of the purposes, namely development, and have not done, in my opinion, a very good job even in pursuing that option. However, their responsibility to protect the environment, it seems to me, involves a case study in nonresponsive government. As a matter of fact, environmental groups have had to take them to court at almost every step of the road to teach them how to obey the law. And we are not at all sure that they have learned the lessons yet. It is sad to see that the old buffalo hasn't gotten out of the ditch.

MR. JOHN WELLS [University of Denver]: Dr. Freeman, in yesterday's *Wall Street Journal* there was an editorial that implied that your study was advocating a zero economic growth for the United States. Is that a correct statement?

MR. FREEMAN: I read that article. My memory is that it didn't say that our report said that but, in any event, our report does not advocate zero economic growth. We do lay out the possibility—which I think is plausible—that toward the latter part of this century this country could become saturated with energy and achieve a zero growth in energy consumption, just as we achieved a zero growth in population. However, that phrase can be rather misleading.

Even with zero energy growth we would be consuming during the latter part of this century ten to twenty percent more than we consume today. This, in turn, would require a tremendous amount of energy to sustain.

The burden of our report is to suggest something rather fundamental—that the growth rate in the economy generally can be separated from the growth rate in energy consumption. It is a commonly held belief, I think, that the two are inseparable.

However, if you think about it for a moment just on the basis of energy becoming much more expensive, one can trade off investments in energy—conserving technologies for more fuel. It is merely a question of putting the marginal dollar into more efficient processes for making steel, copper, aluminum and other materials versus putting that dollar into another power plant. The economy would not necessarily notice the difference, although, of course, more people would be working in one industry rather than in another.

We feel that it is entirely possible to sustain economic growth in this country in the future with a far slower growth in energy than in the past. Indeed, I think it is going to happen to some extent even if the development does nothing more than reflect the workings of the market place.

# Mining and the Public's Resources

Lee Metcalf

*U.S. Senator (D-Montana) Washington, D.C.*<sup>1</sup>

Since the first draft of a speech under a title assigned, I have held some hearings on mining in the West and have had second thoughts about my topic to cover your conference. Consequently I changed my topic to cover mining and the public's resources.

Today we are faced with the fact that there is a wide movement for the greatest giveaway of public lands and public resources in history.

The hearings just completed are on the various phases of hard rock mining, including the Mining Law of 1872. This is the only law that puts the land use decision entirely in the hands of the developer. The miner—individual or corporation—alone decides that mining development is the best use of public lands, without regard to other values. Nor are there requirements for rehabilitation.

Under the 1872 law, individuals or corporations go onto the people's land without paying a fee, with a minimum of regulation, file a claim on the resources of the land which does not belong to them and without paying the people who own these resources.

Other minerals—among them oil, gas and coal—are developed under leases by our Federal Government. The leasing system does give the landowner—the people of the United States through our Federal Government—a role in deciding the proper use of the land. It also provides for payment to the owner for the use of the land and protection for other resource values.

So it seems to me there should be great concern from great national organizations dedicated to preservation of the rights of the public to continue wise land use, a vital part of our national heritage. I am concerned and hope that you will make this a high point on your agenda.

But even more than my concern over continued use of the Mining Law of 1872 to exploit the people's resources is my concern over the strip mining of coal in the West and the potentials contained in the recent act passed by the Senate and under consideration by the House of Representatives. This is the range where the buffalo roamed. Today it abounds in deer, antelope, pheasant and grouse. Recently, there was a wild turkey season in southeastern Montana.

Now for some history.

The concern with land and minerals dates back to Colonial times when the original colonies ceded claims to the western lands and minerals to the Federal Government. The Land Ordinance of 1785 reserved one-third of certain minerals automatically to the Federal Government. Congress, in turn, began selective mineral reservation and preservation policies in 1807. There is no question about the right of Congress to regulate and dispose of public land.

It is interesting to note that Congressional and public concern over minerals

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<sup>1</sup>In the absence of the author, this paper was presented by Senator Metcalf's administrative assistant, Brit Englund.

in public land originally dealt mainly with “scarce” and “valuable” minerals—such as gold, silver and copper. Coal and coal ownership questions were not originally a major concern of those interested in minerals. Coal land administration, however, was treated in the same ambiguous fashion.

Public land and mineral policy grew from a classic conflict between groups with a laissez-faire development attitude and groups who, for various reasons, wanted public control and planned development of the virgin frontiers. Although the lines of conflict were seldom clearly and easily drawn between these groups, this basic clash was the undercurrent in almost all of the debates surrounding public land and public minerals.

The movement for land use reform grew in the 1830's mingling with several other movements. They included Greeley's land settlement movement and the idea of some economic theorists who saw the public lands as a “safety valve” bleeding off surplus labor from the East. These forces pushed for some form of federally controlled, cheap system of land settlement. These same forces were concerned that any land development policy would quickly be exploited by speculators who would rip off tremendous profits while scuttling the program's intent.

This possibility of exploitation inhibited enactment of settlement laws for years. President Buchanan vetoed forerunners of the Homestead Act of 1862. Among other things he feared that such legislation would enable capitalists using dummy entrymen to accumulate large tracts of land solely for corporate profit. Reacting to this veto, Congress amended what became the Homestead Act of 1862 to require homesteading applicants to swear they would use their land for settlement and cultivation.

But Congressional safety measures, for reasons including an inadequate and sometimes corrupt administration, were insufficient to prevent wide-scale misuse of public lands. Misuse of the lands aroused indignation in the mid-1800's when land scandals were common. In 1886 Governor Alvin Saunders of Nebraska urged his legislature to petition Congress to prohibit disposal of public lands for any purpose other than actual settlement.

The actual beginning of the movement away from exploitation of minerals and government laissez-faire attitude began in 1851 when Secretary of the Interior Thompson found it difficult to reconcile the inconsistent Federal minerals policy. While he was looking for uniformity of policy, his actions did bring the question of disposal of public resources into the light once more.

Congress tried many methods to deal with the minerals on public lands problem subsequent to reserving certain minerals (including coal) in the Homestead Act.

Congressional intent and government interest manifested themselves in curious ways from 1866 to 1870, but the strictly laissez-faire policies were by now at least officially not in vogue. For the rest of the 19th Century fuel minerals were handled by piecemeal legislation which, for the most part, failed to consider the whole range of the policy problems.

While Congress began to change its policies, the federal agencies responsible for administering the public lands began to change theirs. As early as 1875, S. S. Burdett, then the Land Commissioner, expressed fears speculation would preempt settlement. The first actions to classify and thereby reserve and

prescribe land use came from pressure exerted by Major Powell and the Public Land Commission in 1879. By then, valuable public domain augmented the work of conservation and settlement-oriented factions to control and preserve mineral deposits.

A series of executive and Congressional actions in the latter part of the 19th Century tightened public control over public land and resources. Promotion of homesteading rather than outright sales of lands was one method the Government used to foil concealed commercial exploitation. That tactic was not exceptionally successful. Homestead revision legislation began to reflect more concern over misuse of homestead land. Provisions in the 1904 Kinkaid and Enlarged Homestead Acts limited entries and implied a type of classification (and therefore regulation) of the lands, but since there were no enforcement provisions, restrictions were not significant. Even President Taft, who had some reservations about government interference, used a measure providing for the classification of the remaining public lands "according to their principal value or use." Taft's measures won Congressional approval.

The preservation-conservation attitude toward public minerals and public lands found one of its most ardent and active spokesmen in Taft's predecessor, Theodore Roosevelt. Roosevelt wondered whether the Government and the people were getting their fair share from federally-owned coal lands. To remedy this he began "withdrawing" large acreages of mineral lands from disposal under the mining law while advocating the then novel "multiple use" idea. The opposition included more speculators and developers, westerners interested in attracting more people and money to their areas, and those who wanted to settle on public lands.

In 1907, Roosevelt asked Congress to pass preservation-oriented legislation on the coal lands. He primarily stressed the need for conservation of the remaining mineral fuels in the public domain, not only to prevent waste but also to preserve a portion of the remaining coal resources for future generations. He felt that "mineral fuels, like the forests and navigable streams, should be treated as public utilities."

Roosevelt recommended that the most effective way to deal with this resource would be to enact "such legislation as would provide for title to and development of the surface land as separate and distinct from the right to the underlying mineral fuels in regions where these may occur, and the disposal of these mineral fuels under a leasing system on conditions which would inure to the benefit of the public as a whole."

Although he did not specify the details of such legislation, he felt the system should be administered "in the spirit of generosity" which had characterized our earlier disposition of public lands. After noting that 30 million acres of coal fields had already passed into private ownership, he suggested that legislation of the type he proposed would give the Congress ample opportunity to determine how the two systems—private ownership and public leasing—operating side by side, actually worked.

In the second session of the 59th Congress several Congressmen introduced a number of bills to implement Roosevelt's concept providing for both severance of surface rights from underlying minerals and for leasing. Partially because of Congressional lethargy and partially because of strong opposition, none of the first series of bills ever made it out of committee.



Roosevelt did not give up. Later in 1907, he announced to Congress that experience in other countries of the world had proved that coal mining and agriculture need not be mutually exclusive. On his last day in office, Roosevelt signed an act permitting severance. The statute provided that a good faith entryman under the nonmineral laws of land later classified as valuable for coal might nevertheless receive a patent to the surface, subject, however, to a reservation of the coal to the United States with a right to prospect for and mine the coal.

In the early days of the Taft administration (1910), this act was liberalized to permit entry under the nonmineral land acts even after land withdrawal or coal land classification.

With this background, the measure which became the 1916 Stock Raising Homestead Act was introduced, first in 1914 by New Mexico Congressman Harvey B. Ferguson. The measure was pushed through Congress in a slightly different form two years later by Colorado Congressman Edgar T. Taylor, who lived to regret his accomplishment. One of the major selling points of the Stock Raising Homestead Act was that the land to be homesteaded was “chiefly valuable for grazing and raising forage crops.” According to Ferguson, the main object of such a measure was to “restore and promote the livestock and meat producing capacity of the semi-arid states, and . . . to furnish homes to landless and homeless citizens of our country.” As with the other homestead measures, coal and other mineral rights were *to be retained by the Government and no commutation was to be allowed*. Less than 18 years later, Taylor concluded that these grazing lands should be retained in federal ownership. The Taylor Grazing Act of 1934 so provided, and, for all practical purposes repealed the Stock Raising Homestead Act.

And so today in the West we have more than 60 million acres of divided ownership, divided ownership of two main types. We have land where the ranchers and suburban homeowners own surface rights and the people of the United States have reserved for themselves the mineral rights. This was one of the great conservation victories of that time. Men and women interested in wise use for the benefit of all people were told they had won a great victory in saving these resources for the nation and maintaining the mineral rights in the ownership of the Federal Government.

This divided ownership of surface rights and mineral rights exists not only where the Government has never given its mineral rights, but sometimes occurs when the mineral rights are sold separately from surface rights. So one man owns the surface—and another the underlying minerals. Then there is a third type of divided ownership. An example is in Southeastern Montana, where the Tongue River Reservation of Northern Cheyennes was opened for settlement after the land had been taken away from the Indians and so Congress returned to the Northern Cheyenne Tribe the mineral rights to that land. In that area, surface rights are owned by ranchers, livestockmen and farmers and mineral rights are owned by the Indian Tribe.

The issue of divided ownership of minerals, especially coal, has become more pressing with the energy crisis-inspired push to develop all coal. This push for development could result in the greatest American land resources giveaway in history. There are those in the House of Representatives who would give to the

surface owner the public right to strip mine the publicly-owned coal—give the surface owner the veto power over development of a public resource—allow the surface owner to build a toll gate on the way to access to public resources. Enactment of such legislation could lead to purchase of these public rights by the coal companies. Such action would reverse the victories won not long ago by conservationists and government officials who wanted to protect the people's interest. The giveaway would entail billions of tons of coal—gold, if you will—that belong to all of the people of the United States.

We would all lose in that giveaway—lose to the enormous profit of coal companies and surface landowners. The landowners by and large are descendants of homesteaders who have already profited from the land by its agricultural settlement. The giveaway would be an undreamed-of bonus, a bonus which the original homesteaders thought would never be theirs. Those homesteaders went in to develop that land agriculturally, not to develop it for mining. Theirs was an investment for agriculture-related gain, not for mineral-related gain. The Federal Government in allowing the homesteaders to enter that land while reserving the minerals to all the people of the United States recognized that the minerals belong to everyone, were for everyone's use and profit.

Senator Mansfield has tried to meet the issue of the people's coal and the people's minerals under the grazing, homestead and other laws by saying we will not disturb the surface rights, we will leave that coal in the ground preserving it for use only in a grave national emergency, rather than strip mining it.

Under the Mansfield amendment, publicly-owned coal beneath privately-owned surface land can only be mined by underground methods. His amendment complements existing law. It recognizes our Federal Government's rights to regulate and protect our public resources in the public interest. That coal will stay in the bank. The use of that coal is not "lost forever." Congress can always change the law and provide for the mining of coal.

Despite industry claims to the contrary, the Mansfield amendment does not prevent strip mining of all publicly-owned coal. As a matter of fact, there is more coal that would not be affected by the Mansfield amendment than would be. The Mansfield amendment is concerned solely with divided ownership.

But one thing Congress can never do: Congress can never regain our public resources once they are given away. Congress can never restore resources that are wasted. Congress can and must protect our public resources, for the next and succeeding generations.

You should take an active role in Congressional action. You should let your Senators and Congressmen know how you feel about the surface mining reclamation act and the Mansfield amendment to S. 425.

# Environmental Effects of Surface Mining and the Need for Ecosystem Management

William S. Platts

*Zone Fishery Biologist-Surface Environment and Mining (SEAM),  
U.S. Forest Service, Billings, Montana*

## Magnitude of Surface Mining

As man's technology advances so does his ability to alter, control, enhance, and even destroy the ecosystems. As an example of technology in surface mining, electric shovels are now capable of moving over 200 tons of earth with each bite. Meeting the demands for energy and minerals will put this type of technology to the test, if its use is going to leave future generations a semblance of the natural world that has fulfilled our needs. Also, will this technology allow the coming generations to live on and use the effluent we leave behind?

By 1971 over four million acres of land were disturbed by surface mining and related activities (*U.S. Dept. of Interior* 1973). This has affected 13,000 miles of streams and two million acres of wildlife habitat (Spaulding and Ogden 1968). Surface mining accounts for four-fifths of the ore and solid fuels produced. Past mining has centered in the Appalachian and midwestern states, but the shift is now toward the West. As of 1970, about 670,000 acres of federal lands were leased for coal mining in nine western states. In Montana alone there are 42 billion tons of strippable coal, a figure which now appears to be very conservative. According to the Public Land Law Review Commission Report, coal seams available for mining underlie 34 million acres of the 11 western states. Forty-two percent of the known phosphate is in the West. The large oil shale deposits are also located here.

The disturbed lands left by surface mining are reaching 1.5 million acres every ten years and will continue to increase to meet added demand. If improperly reclaimed, this leaves behind tailing ponds, slime pits, spoil banks, and waste disposal areas which not only result in "onsite damage," but the effects are scattered over thousands of miles of stream bottom and carried through the air. South Dakota has reported that 90 percent of its trout streams have been destroyed in the last 20 years, and surface mining was the major factor (Spaulding and Ogden 1968). In Idaho, one mining operation completely destroyed a large run of salmon and steelhead trout (Platts 1972). This magnitude of effects make it paramount that lands disturbed in the future be left in a usable state for coming generations.

## Strip Mining Philosophy

There are two sides to the strip mining coin: (1) the public not only wants a quality environment, but (2) they demand and need energy and minerals. The importance of these materials to our current level of economy and well-being is not disputable. The reclamation of mined lands is not new. The coal industry

has been reclaiming certain mine waste areas for over 50 years. Mined areas with proper advance planning under certain conditions can even enhance the previously undisturbed conditions for certain uses. The thousands of small lakes and ponds created within mined areas in some situations lend themselves to good fishery and wildlife habitat.

The two sides of the coin matched with increasing environmental awareness has tended to separate the environmentalist from those representing industry. This should not be, as both sides have an interest in energy, minerals, and the environment. An organizational structure is needed which combines these interests to meet common goals. There must be leadership in providing the knowledge for the orderly use of the minerals and energy materials, while guaranteeing the after effects can again be useful and even attractive. This leadership must be flexible enough to work on all lands including private, state, and federal.

The first question any decision maker should ask in the quest for more energy and minerals is, "Can the disturbed lands from surface mining be reclaimed to meet future demands for goods and services?" If the answer is "no," we should face the sad fact that future generations will be forced to live with the loss represented by our spoil piles. Of course, optimistic leadership with its tremendous knowledge, will try to answer "yes." If the answer is "yes," then surface mining and its effects are going to have to fit into the complete scope of land use planning and management as a complementary part, not as an overriding single use. No longer can the decision maker leave disturbed lands the way they accidentally fall as a result of the mining process. The natural environment, providing us with present day resources, took eons of time to develop. Once disturbed, the lands and waters and the other uses and resources dependent upon them will require the application of all we collectively know and can yet learn, to shorten the time of their return to the productiveness that will be demanded by generations yet to come.

### **Effects of Surface Mining**

The literature well documents the effects of surface mining on the wildlife-fishery resources and bibliographies are readily available. The after-effects of surface mining have generally not been beneficial to the wildlife and fishery resources affected by development of mineral deposits. Because strip mining removes the overburden, the nonproductive subsurface material often dominates the remaining surface environment. Economics has prevented large-scale movement of this material, thus it lies exposed in a manner most convenient and efficient from the mineral extraction point of view. Haphazard and often accidental arrangement and handling of material and effluent causes the major problems.

The challenge is (1) for land managers to know what the impacts on the land and related resources are, and what the "best" reclamation practices would be; (2) for the land manager and mining interests to be able to sit down together to reach an agreement on what is "best," not only for mining but for the land; (3) for both to agree to in-depth public input into their tentative plans; and (4) for the mining interest to translate the final decisions into demonstrated action. Only in this way will future generations' rights and needs be protected. The

key, then, to energy, mineral and environmental needs, is cooperative planning, programmed development, and the guarantee of the retention of natural resource values.

### **Potential Solution**

Today many individual agencies, corporations, and organizations are doing their thing for input into mining needs and problems. There is very little coordination and the programs need to be meshed together so weak links and voids can be identified. In one potential mining area, one agency may be conducting intensive ground water studies, another agency very general surface water quality studies, while another agency is doing an intensive soil study. Still another agency is planning a wildlife-fishery program, not knowing this environment will soon be modified by mining activities. Other agencies are studying the potential air quality effects from the proposed mining-milling operation, but no agency is determining what may be most important, and that is what will be the effect of the particulate that falls on the land and water. Often these agencies are working independently of each other and their study intensities have great variations. With the different agencies doing their individual work, there is no way to ensure that the voids will be covered and the weak spots strengthened. Most important, no one is setting overall work and study priorities matched to meet the necessary time frame.

An organization is needed that is nationwide in scope and can function on state, private, and federal lands. SEAM (Surface Environment And Mining) is an action program that fits the needed specifications of efficient operation. This organization will help form a partnership with all land managers, industry, and political jurisdictions at all levels, that closely coordinate with ongoing state and federal programs. The end product of SEAM will be in developing new techniques in preliminary planning and design, furthering the application of compatible mining activities, and combining environmental stewardship leading to proper methods of rehabilitation and maintenance.

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### **Discussion**

VICE-CHAIRMAN BROWER: Do we have some questions?

May I point out, while waiting, that when you go on a diet it is either because you are getting too heavy or because you are getting sick. You cannot call this a "food crisis" but it is high time perhaps, that we go on an "energy diet." This will help us get "energy with honor."

MR. STEVE CAMPBELL [Denver]: I remember a conference in Washington in December 1971 having to do with the Corporate Executive's View of Social Responsibility. In this connection, operations in Colorado and in the oil-shale area will probably reduce wildlife, as Mrs. Wright suggested, from 75 to 80 percent. Now, Mr. Bradshaw, is ARCO concerned with the wildlife in this area and, more specifically, what research has the company done in this area and what are your recommendations regarding this? It seems to me, for example, that wildlife has as much value or more value than oil-shale.

MR. BRADSHAW: I can only start by saying that the objectives of business in the United States go far beyond making a profit — we have social responsibilities, which include not only responsibilities to the environment but in social areas as well. Therefore, if we do not let the American people fulfill their aspirations in achieving social goals and environmental goals, then they will no longer permit us to stay in business.

However, I always say at the end of any such statement, that we also have a responsibility to make a profit because, under the rules of the game as they are played in the United States and the free enterprise system, if you don't make a profit, you are no longer in business and it doesn't matter how many speeches you make, you no longer have a hand in the creation and development of social responsibilities and environmental responsibilities from a corporate viewpoint, at least. You play yourself out of the game if you do not make a profit. That, basically, is a resume of what I said in 1971, at the conference to which you referred.

With regard to the specific questions you asked, are we interested in wildlife or in the Western Slopes of Colorado? Well, we have spent some \$3 million thus far and have made some 80 environmental studies, among them several devoted to wildlife.

Our conclusions are not those of Mrs. Wright. We will obviously have to show those conclusions and let the people see the specifics of these studies and then the people will decide whether or not they want to have a shale industry in Colorado.

MR. CAMPBELL: These conclusions were the conclusions of the Colorado Division of Wildlife, not Mrs. Wright. She was merely re-emphasizing the point.

MR. BRADSHAW: Well, we disagree with the conclusions of the Colorado Division of Wildlife.

MR. CAMPBELL: Even though they are aware of the area in which they deal — you still disagree with them?

MR. BRADSHAW: Definitely. We also disagreed with some people in Alaska and, as a result, found out more about caribous in a period of four years than anyone had ever known before.

VICE-CHAIRMAN BROWER: Are there other questions?

MR. WAYNE TYLER [Standard Oil of Indiana]: I believe that several environmental groups have made considerable effort to get the total cost of energy into the prices the consumer pays. I believe that Mr. Bradshaw's company and my company would certainly like to receive endorsements from your two organizations in the deregulation of natural gas at the wellhead, which would establish two things — one of which is to bring the total cost into play in relation to this very important natural resource and, secondly, make it usable to solve a lot of our air pollution problems and bring the price up to where we can go find more. We believe our companies and other companies in the industry can find more to where we will be able to solve some of our air pollution problems in our bigger cities. I wonder if I could have a comment on that from either of you.

MRS. WRIGHT: Of course, I think we always have gone along. We also, and I speak personally, talk about allowing the gas product to reach a price level that reflected a true cost. Now, after reading that report, I will also say that I think the consumer is already paying enough.

VICE-CHAIRMAN BROWER: It is my opportunity to make a speech but I won't. However, one thing that worries me about natural gas is that between one-half and two-thirds of the natural gas of the world is now being flared at the wells. It can be made into other products.

Likewise, I am very much worried basically about the deregulation effort. I think that a great deal of what is going on in the energy world today is an attempt by the industry, all aspects of it, to acquire enormous amounts of capital to sustain the kind of demands we require.

There is a reticence right now on the part of the oil companies to go on exploring for the amount of energy that they think they need. The atomic industrial complex is looking for about the same amount and I guess other energy people are in for the same thing.

Right now we are so heavily engaged in relation to our energy thinking that we forget that there are some very other important thoughts. We are forgetting something of the extraordinary trade-offs that we face — some of the frightful options that we are not offering ourselves.

Right now the French are still building the SST and this relates to oil. Further, the Concorde will use every year enough energy that, if this were put in the development of nitrate fertilizer, it would involve some 20 million people.

I think the great mistake that we are getting into is that we are counting on a growth which this planet, being a finite one, will not allow us to continue. In our efforts today we are almost totally discounting the next generation. We are saying, "let's get into the 21st century," however, how about the 22nd and 23rd centuries? I think this country and a good many other countries have to do just that.

We don't need to finance this frantic search for more and more and more. We have to recognize the limits to growth and until we do that, we are going to be in all kinds of trouble. We are going to run out of a lot of things before we run out of oil, a lot of things before we run out of phosphate. For example, we are presently running out of food for millions of people. We are going into more and more intensive agriculture, and in agriculture alone we are probably seeing on the horizon now the famine which was supposed to be here in 1975 being present in 1974.

I don't think that deregulation is quite the right answer or stimulus but, on the other hand, I am not arguing against the profit system at all because, whether anybody else likes it or not, the corporate structure has a corner on ability to administer, to organize, to get things done that other agencies do not have. Therefore, I certainly have a great faith, a great belief in what the corporations can do, but I do want them to do more of what they started to do in 1970, when Mr. Bradshaw had a group of conservationists up at the North Slope. I was among them. I would really like to see an acceleration of this kind of corporate responsibility to help lead the way and to help get us away from the cliff we are driving toward.

MR. ENGLUND: I did not hear the question but I was moved to get into the act.

This whole energy business we are in is really a never-never land. For example, Consolidated Edison urged its rate payers in New York to use electricity. Fine, people used electricity. Then Consolidated Edison came before the regulatory bodies and said that since people were using electricity, they had to have a rate increase. They got their rate increase and, on top of that, when the cost of their fuel went up, they got another rate increase. Therefore, the poor slob who is using it, just paid for this education not once, but twice and also got belted with an increased cost of fuel.

CHAIRMAN THOMAS: In closing, I want to express my thanks to David for his assistance as vice-chairman, to all of our speakers, to the audience. You have all been very patient. I will now turn it back to Dr. Jahn.

# Closing Remarks

Laurence R. Jahn

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

We come to the close of the 39th North American Wildlife and Natural Resources Conference. Again, we are indebted to the many individuals who have contributed so much time and effort to plan and stage this successful international meeting. The Program Committee offered invaluable suggestions for the overall conference theme and nature of the individual sessions.

Terry A. McGowan, representing The Wildlife Society, served as vice-chairman for a second year and provided valuable contributions for the content of the well-attended sessions.

A personal acknowledgment will be forwarded in the near future to the many other individuals who assisted in providing the accommodations, facilities, and services required to make this conference a pleasant and rewarding experience. Through their efforts, slightly less than 1300 people were registered in this first year of charging a nominal registration fee.

In 1975 the conference will be held in Pittsburgh, Pennsylvania from March 16-19. The Program Committee will meet later this month to begin to develop the agenda. Your constructive suggestions for topics and speakers to highlight critical international, national, and north-eastern regional resource problems will be welcome.

On behalf of the Wildlife Management Institute, many thanks for your participation in this important conference. Have a safe and enjoyable trip home.

The 39th North American Wildlife and Natural Resources Conference stands adjourned.



# Registered Attendance

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## ALABAMA

Hobson Bryan, Tom R. Eubanks, W. L. Holland, Jim Keeler, Charles D. Kelley, Claude D. Kelley, Raymond D. Moody, Carroll J. Perkins

## ALASKA

James C. Bartonek, Bud Boddy, Samuel J. Harbo, Jr. Ben Hilliker, Joe Josephson, Robert Le Resche, Steven T. Leskosky, Urban C. Nelson, Sig Olson, Robert A. Rausch, Burt Silcock, LeRoy W. Sowl, Robert B. Weeden

## ARIZONA

William H., Beers, W. R. Brigham, Mrs. W. R. Brigham, Boyd Evison, Robert A. Jantzen, Jerome J. Pratt, Harold H. Ramsbacher, Jay Schnell, Mrs. Jay Schnell, A. Reynolds Temple, N.A. Winter

## ARKANSAS

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