REPORT OF THE COMMITTEE ON NORTH AMERICAN WILDLIFE POLICY[1]

This report is a reexamination of principles and programs affecting our wildlife resources. It supplements and updates the historic statement of December 2, 1930, by the American Game Policy Committee. As chairman Aldo Leopold told the Seventeenth American Game Conference, the original committee was primarily concerned with game problems. However, their report did not fail to recognize the important social values of all wild creatures.

Today's great environmental issues are, literally, without limit. In one context or another, we find ourselves dealing with all living things. However, in its concern with policies and management, the committee conceives wildlife to mean, most commonly, free-living animals of major significance to man.

We regard management as the application of knowledge in the regulation and enhancement of wildlife resources for human benefits. Most notably it consists of meeting the habitat requirements of all species, adopting necessary regulations, and providing for enforcement.

In the sense used here, a policy is a course of action recommended as a preferred means of serving the continuing public interest.

In proposing guidelines for administration and management, we abstract, as best we may without consensus, the findings of experience and research. We build upon the report of 1930 in confidence that the total record will provide useful terms of reference for people who face decisions.

As in the past, the major objective is to preserve and improve the wildlife resource. This states our support for the traditional maxim of conservationists, that wildlife should contribute to the greatest good of the most people over the longest time.

This report is addressed most specifically to problems we know best, those of North America. However, it offers substantial ideas that might well be exported around the world. As an independent product of citizen concern, it could help advance the cause of a universal ecology in the minds of people of many nations. We regard this as a conceptual goal for the future.

In its composition, the committee encompasses representation from Mexico and the long-established participation of colleagues in Canada. Since a majority of members are from the United States, the programs of states are frequently referred to. If any criticism is implied, we feel most free in applying it to ourselves. Where the word "state" is used, let anyone who finds it appropriate read "province," or other governmental unit.

Why Again?

We find a new need to affirm or create policy because new standards and rules are emerging in our society. The last half-century has brought great changes, and more are on the way.

Although the future is unpredictable, certain trends are evident. From today's unprecedented peak of population, there will be a further increase in decades ahead. Our resource-consuming technology will continue to grow. Pressures on the environment will exceed anything yet seen, as every kind of natural asset is under accelerating demand.

This may describe a creeping crisis. However, somewhere ahead men on earth are likely to encounter a period of ultimate

[1] Presented by Durward L. Allen, Chairman.

trial. That could be a time when too many people in a vastly overtaxed environment will find wisdom to match their knowledge. They may then permit their numbers to decline to a level where lives of dignity and fulfillment can be available to all. This outlook faces hard realities, but it offers a hopeful future and should be a constructive basis for policy making.

For now, we must prepare for tensions and shortage. Wildlife and outdoor pleasures are the most fragile and vulnerable part of our living standard. How will they rank in times of resource emergency?

They will need public acceptance as a competing value in our uses of land and water. They will require high priority in political and economic decisions. Otherwise they will be lost in the present, and their future will be foreclosed.

In a sense, our program for wildlife is a holding action. Today and in years immediately ahead, the first big job is to prevent irreversible losses—of species, populations, and life communities.

But an equal challenge is to prevent a cultural loss. Widely varied patterns of living are among the many kinds of diversity that enrich the human experience. In our rapidly urbanizing population, many are already estranged from outdoor interests, earth knowledge, and pioneer skills. These elements in our culture should remain available to generations beyond our own.

The Record of Progress

The first policy report was outstanding in its far-sightedness. It described problems that are still with us, but it also saw needs that have been largely fulfilled. There are important entries in the credit column:

Large acreages of land and water, in public ownership, are dedicated as wildlife habitat and devoted to public use.

Wildlife management has been professionalized. Many colleges and universities offer a wildlife curriculum and its supporting courses in biological, social, and earth sciences.

Centers and programs for wildlife research have been established and funded to provide facts on which efficient management can be based.

At all levels of government much has been done to free wildlife administration from the blight of partisan politics.

Energetic and well-informed citizen organizations are supporting the causes of public interest and ecological management.

Let us hasten to say that more should be accomplished in these fields. More critically, our present report describes issues—some of long standing—on which we have hardly made a constructive start. It may be that the easy solutions, if there were any, have already been applied. The future of wildlife is entangled in the total complexity of man's relationship to nature.

PRINCIPLES AND PREMISES

Decades of this century have witnessed steady gains in useful biological knowledge. Among leadership there is growing sophistication in attitudes toward wildlife and its associated resources. From both science and philosophy we draw assumptions it seems constructive to state:

Each living thing survives and plays some essential part in the operation of a self-maintaining community of plants and animals. The community and its site, including climate, constitute the ecosystem—the basic working unit of the biosphere.

Habitat is local environment. Its quality determines abundance or scarcity for

any species. Habitat improvement is the fundamental need in producing more wildlife.

Man's ecosystem is the entire earth. He must plan its use, protection, and renewal. For the support of all life, its natural processes of rejuvenation and replenishment must continue to operate. This is the great challenge of environmental deterioration.

Man's dependence on living things is a reality of survival. He must be willing to share the earth with other forms of life. Their right to exist should be an acknowledged ethic.

Environmental fitness may be judged by the welfare of many creatures. Regional declines of wildlife indicate maladjustment. They bespeak the need for identification of causes and remedial action.

Governmental or professional responsibility in resource management carries a paramount obligation to the general public interest.

In many useful combinations, soils, waters, vegetation, and animal life are renewable resources—natural wealth and durable systems that can be preserved and improved through a knowledge of life processes. We regard the use of a renewable resource as optimal when it yields the most significant benefits to generations of the present while improving productivity for the future.

WILDLIFE USES AND VALUES

There are satisfactions in human life that have been taken for granted and poorly appraised. Freely enjoyed benefits of the natural environment are notable in this respect. Historically, and particularly among people least familiar with it, wildlife has been an idle cause, easily downgraded or ignored.

The future of such viewpoints is uncertain. People will continue to concentrate in cities. The habits and demands of many will be adjusted to artificial surroundings. Will an increasing proportion of them be deprived of nature-oriented interests? Or will the complexity of their lives cause a turning to outdoor pursuits?

This committee proposes that wildlife has an important place in the kind of living standard Americans should strive to preserve. Its values are of several kinds, and their social significance should grow in times ahead.

Living Environment

Since early in the century, professionals have recognized that the esthetic, "nonconsumptive" enjoyment of wildlife in the out-of-doors is by far the greatest value of this resource. There are creature inhabitants in dooryards, city openings, farms, and hinterlands, and in every kind of water area. They lend essential character to our human habitats.

As the ideas of beautification and open space get more attention, the wildlife of urban areas assumes particular importance for its environmental and casual uses. The basic requirement is habitat, and the way of the future is shown impressively in certain cities of North America. Ottawa's surrounding greenbelt, the waterfront parks of Minneapolis, the Chicago Forest Preserve, and Rock Creek Park in Washington are famous examples.

Surveys indicate that bird watchers and nature photographers are about as numerous as hunters, and they spend more time afield. Memberships in nature and conservation organizations continue to increase. Environmental interest is at an all-time

high and growing. This universal worth of wildlife to people defies measurement.

Similarly incalculable, and even more basic, is wildlife's biological role. Each living thing of the community has a function that affects all the others. Often we see specific interactions in terms of human interests, such as the abatement of insect pests by songbirds or the suppression of crop-damaging rodents by predators.

But more subtle processes are at work. Many kinds of organisms help maintain the living system of the soil. Animals distribute seeds and do the thinning and disturbing that many kinds of plants require. Meat-eaters bring the benefits of population control to their prey, and especially prevent destruction of the vegetation food supply.

These relationships are implicit in the survival of ecosystems. They are intrinsic environmental values that benefit us all.

On public lands and waters of every type, wildlife is being used by people with many interests. Often license money and taxes on firearms, fishing tackle, and other equipment are the only sources of funds for purchase and management. As an outgrowth, state administrative agencies have been oriented mainly toward service to those who support their programs. Frequently, nongame species have had only incidental attention.

A new trend is in progress. Game and fish agencies are getting broader responsibilities as wildlife agencies. Ways are being found to supplement their license-based funding through special taxes and appropriations representing contributions of the general public. The urban dweller should expect that substantial amounts of these funds will be spent on the species that help bring open spaces to life in our areas of high human density. This is the pattern an enlarged program of public wildlife services can be expected to follow in the future.

Field Sports

Since primitive times, certain animal species have been important for fishing and hunting. Such pursuits still provide subsistence to a few native Americans, but for the bulk of the population they represent recreation. The eating of fish and game is the final act in savoring an outdoor experience.

These uses of waters and land continue to grow, as surveys by the Fish and Wildlife Service show. The survey of 1970 indicated that people who fish outnumber those who hunt by well over 2 to 1. In the United States there were 36 million who participated "substantially" in one or both activities, approximately 18 percent of the total population.

The rate of increase in fishing and hunting may level off in decades ahead as a result of several factors:

Continued urbanization of the population.

The ever-greater difficulty of finding open waters and lands.

A growing scarcity of high-quality sport.

The concentration of fishermen and hunters.

Increasing interest in other forms of recreation.

In economic terms, fishermen and hunters contribute substantially to outdoor recreation industries and to public management agencies. Their expenditures in the field during 1970 were more than $7 billion. Their federal excise tax totalled nearly $47 million and their state license fees $192 million. As a taxpayer, the sportsman also has his share in all general levies for conservation and management. We endorse license fees adequate to provide for quality programs of fishing and hunting under conditions that protect the many other outdoor interests of the public.

Commercial Uses

The harvesting of some kinds of wildlife for the market has continued since earlier times. Today our chief concerns in this field are (1) to eliminate commercial uses of endangered species, and (2) regulate appropriate commercial harvests to assure a sustained yield and maintenance of the resource.

An annual cropping of wild furs was once the primary industry of North America. That has undergone a long decline accelerated by the development of artificial substitutes. In addition, an ethic is developing against the wearing of wild furs. The beaver, mainstay of that early fur trade, was nearly wiped out in much of its range. It has now been widely restored by good management in states and provinces. Two oceanic species—the northern fur seal and sea otter—were literally rescued from extinction by timely international agreements.

Major problems are posed by the existence of a world market, as witnessed recently in the case of novelty furs. Heavy inroads have been made on many species of cats, especially in tropical countries. Under authority of the Endangered Species Act of 1969, the United States banned importation or sale of wildlife threatened with extinction. We anticipate a further strengthening of this legislation, but it exemplifies the action individual nations can take while effective world conventions are being sought.

The most significant industry marketing wildlife today is the commercial fishery. Its past history has been marked by the failure of responsible agencies to set and enforce harvest limits within the recovery capacity of fish populations. The result has been depletion of important fish resources.

In Canada and the United States, fishery research biologists have established a substantial fund of management information. This will continue, and in decades to come important sport and commercial fisheries will be restored.

Today's major issue is, again, an international problem. It concerns the right of nations to control the fisheries on their adjacent continental shelves. Foreign fleets, without incentives for moderation, are overexploiting stocks of fish on both coasts of North America. We subscribe in principle to a resolution of the American Fisheries Society. This called for a major extension of the zone of national jurisdiction to make possible scientifically controlled cropping of fish and other sea-food resources. This protection of local industries will create incentives for intensive management. Mariculture is a promising new industry with great potential for the production of shrimp and pompano in particular.

We must recognize, in addition, the worldwide plight of many kinds of whales. Here, international control of the harvest is urgently needed and much in question. The protection and rational management of all living things in international waters requires a responsible world commission. Unlimited demands for food and the continual development of more efficient harvest gear have the potential for irreversible damage. It could include not only exterminations but major changes in the life support system of the oceans.

Of the many uses of wildlife, those producing profits to industry and monetary gain for individuals are the most difficult to control. Where a commercial harvest is allowed, two rules apply: Regulations must be scientific and impartial. They must be rigidly enforced, both in the field and by the courts.

SURVIVAL: THE GREAT PRIORITY

As stated previously, we anticipate a continuing increase of human population and

inroads on resources. The problems of endangered species will become more critical as such conditions develop.

Present expedients to protect and restore our jeopardized wildlife are inadequate—a result of fragmented jurisdictions. A succession of clear and interlocking responsibilities should be established for such species from local, through state or provincial, to federal, and international levels.

This committee urges that a new worldwide perspective be promoted by the nations of North America. It would recognize that all peoples have a common concern for the survival of plants and animals still existing on earth. We regard this as a feature of the right-to-live concept already advanced. In a utilitarian sense, the preservation of species leaves options open for generations to come, who may find unpredictable uses for many organisms.

Various kinds of international negotiations are in progress to facilitate cooperative wildlife management. These efforts should be extended to include worldwide conventions on threatened species, wherever they may be. An international custody is needed now and in the future for living things that decline to the point where extermination is possible.

This would have value of a particular kind in the United States. The Federal Government has received jurisdiction over many species of birds and certain marine mammals through the treaty-making powers of the President. This authority, which is restrictive upon that of states, implements treaties with Canada, Mexico, and Japan. Whether or not it is acquired in this way, a federal sharing of responsibility is needed to assure improved measures for the restoration of diminished "resident" species covered only by state laws.

WILDLIFE IN LAND AND WATER USE

The welfare of wildlife depends on what happens to its habitats. Thus its future should be planned in a framework of policies for land and water. In the not-distant future, we may expect congressional action on a comprehensive national land-use plan. We urge that such a plan for the United States embody several features of far-reaching significance:

The third of our area that is public property should remain so. It is the estate of many generations, to which values will steadily accrue.

The remaining public domain should be managed with greater attention to its multiple benefits, including recreation.

A national zoning of uses should eliminate urban, industrial, or other encroachments on fertile soils, prime grazing lands, productive forests, flood-prone areas, and a wide range of aquatic sites.

Great scenery and our declining natural environments should have protection from impinging uses.

In planning ahead, we must assume that basic decisions along these lines will be made in the public interest. They will open important opportunities to improve the status of wildlife.

Agricultural Lands

In a recent 17-year period, American farms declined in number by two and one-half million, acres harvested declined by 34 million, farm employment declined by 5 million, and the yield of crops increased by 37 percent! Since the wildlife policy report of 1930, the tractor has replaced the horse and released more than 60 million acres from the production of feed. At least an equal acreage is now withdrawn annually to reduce the production of surplus crops.

These changes affect wildlife both favorably and adversely. On farmland wildlife is largely a by-product, and its status is tied closely to economics and the intensity of land use.

Big-business Farming

In regions characterized by extensive, continuous areas of highly productive cropland, agriculture has become a specialized industry. The cropping pattern features, literally, square miles of monocultures—commonly corn, sorghum, wheat, soybeans, or cotton—worked by costly equipment. Heavy use of fertilizers and pesticides is the rule. Land leveling, drainage, cover removal, and extensive fallowing or fall plowing produce a landscape almost totally wanting in the habitat diversity needed by most birds and mammals.

On the fringes of such regions, or where uncleared stream bottoms intrude, grain and hay fields contribute to the production of pheasants and other wildlife; they may be valuable feeding areas for migratory waterfowl. But in the face of high cash-crop values, no general recommendations can be made for devoting space to the cover that is the most obvious habitat deficiency for many kinds of wildlife. As they are at present, the most valuable agricultural soils of the continent are largely unavailable for the management and use of wildlife.

The future of the great monocultures is uncertain, since they are ecologically vulnerable. There are signs that crop interspersion may have values in the biological control of pests. Rotations may be necessary to the long-term maintenance of soils. Lands withdrawn from cropping certainly would have greater public value if seeded to vegetation serving the range of conservation needs. There may yet develop a land-use design more favorable to wildlife, and management authorities should be prepared to take advantage of it.

Diversified Farming

Fertile soils have long been recognized as having high potential yield of living things. Extensive conversion of the eastern deciduous forest into farmland favored the spread and increase of many birds and mammals, including those Leopold called "farm game." The same process reduced big game and other creatures requiring large woodlands.

During the thirties, the Soil Conservation Service began promotion of their conservation farming system, which has been particularly significant to wildlife in regions of irregular topography. Individual farm and ranch plans provide for cropping according to land capability through contour farming. The system involves strip-cropping, stubble mulching, and other practices, and it produces edges and a mixture of vegetation types that favor most farm wildlife species. The needs of erosion control result in managed problem areas and uncultivated sites. On these, perennial wildlife cover can be planted or allowed to grow through natural succession.

The bulk of our farmlands grow a diversity of crops. With the land-use plan as a basis, an owner can manage wildlife as intensively as he wishes. Plantings of shrubs and conifers can be used on sites appropriate for hedges, windbreaks, field borders, and "odd area" coverts. On most farms operated for profit, the best policy for a farmer is to allow natural woody cover to become established and to tolerate it where it is not in his way. Wildlife management and beautification are issues of growing importance on the small "residence" farms of city workers. In nearly all rural areas much more could be done to improve habitat and to make wildlife more useful to

people. A greater promotion effort—one that would bring farmers the help of true expertise in this field—would pay major dividends if carried out cooperatively by wildlife and agricultural agencies of states and the federal government.

Our outstanding example of the manner in which a wildlife management practice can catch on is represented by the two million farm ponds on private lands of the United States. This program has even greater potential for the future, as additional ponds are built and regional fish management methods are refined. The landscaping of pond sites for homestead values and wildlife cover has been generally neglected and offers state agencies excellent possibilities for developing working relationships with farmers.

Challenges in Farm-wildlife Management

Urgent problems in agricultural lands demand more research, technical assistance, legislation, and administrative attention. They involve both resident and migratory species. Solutions frequently will require cooperation among several agencies:

Trespass control. Good game lands attract hunters. With a few of those hunters come illegal entry and property damage. We should build on the important pioneering work in some states to develop more effective cooperatives and regionally adapted plans for protecting the rights of landowners in heavily populated areas.

Incentives for managing wildlife. Attractive means of compensating farmers for habitat improvement are needed. Practices beneficial to wildlife should qualify in agricultural subsidy programs, where they have achieved only slow recognition. Wildlife cover and food plantings, specified by biologists, should be incorporated into planning for land and water areas retired or set aside from cropping.

The plans of soil conservation districts and watershed programs need greater input by state biologists and wildlife extension specialists. On farms wildlife habitat development integrates naturally with erosion control and beautification practices.

Damage to field crops. Wildlife administrative agencies must assume greater responsibility in the form of technical aid, material support, and insurance programs.

Forest and Range

In 50 states there are 754 million acres of forest land, of which two-thirds is available for the harvest of wood products. Of these commercial forests 136 million acres are in public and 364 million in private ownership. In the contiguous states, 69 forest or forest-grassland types are recognized. This great segment of the national out-of-doors supports wildlife in wide variety. It receives increasing recognition as a reserve of recreational open space. Management for multiple uses has made a good start in national and state forests. However, properly balanced land management is an objective that must be pursued far into the future.

Of public grazing lands in the United States—some 243 million acres—about three-fourths is administered by the Bureau of Land Management as unallocated Public Domain. Use of these lands is still largely under the domination of local stock-raising interests. Within its responsibilities the bureau has made significant progress, but recreation and wildlife management need much more attention on these public properties. The program requires greater agency authority and funding, which we strongly advocate.

Wildlife in the Cutting Cycle

Timber harvest creates openings and sets plant succession back to ground vegetation and brush stages. In many forest types these pioneer associations are essential habitat for wildlife. In degree, opening the tree canopy leaves conditions comparable to those produced by such natural disturbances as fire, wind, and avalanche. All stages of growth are used by some species of birds and mammals. A frequent requirement is for a combination of several stages —the intermixture that means productive edges. Sometimes these conditions are present in mature forest, notably in certain northern types, where open stands of conifers develop a vigorous understory. There are places where cutting is disadvantageous to wildlife.

At issue in the management of timber and forage is stability of the watershed. Obviously this is critical to the water-yield value. In addition, marshes, ponds, and beaver works in every stage are habitat for many creatures. The viability of streams is greatly dependent on adequate forest and ground cover. Stream destruction also takes other forms, such as mining for gravel or gold, or clogging with slash.

The management of timber, grazing, wildlife, and people requires an integrated plan for individual forests. Cutting practices have been controversial, and experimentation must continue. Common needs of wildlife suggest the direction of management in appropriate woodland types:

Any clearcuts should be small.

A good mixture of age classes and species is desirable.

Fruit- and mast-bearing trees and shrubs should be retained in stand improvement.

Good hollow trees should not be destroyed.

A border of trees should be left along waterways, and streambeds should be undisturbed.

Piled cuttings should be left unburned.

Fire in Forests and Grasslands

Wild fires can be hugely wasteful. But planned burning is essential to the maintenance of certain habitats and to the wildlife they support. Research has shown the need for prescribed surface fires in perpetuating many conifer types—including areas in designated wilderness. In these we court disaster by fire suppression for long periods. Instead, frequent "gentle" burnings in imitation of the natural pattern must be a part of management.

Fires played an essential role in preserving most of our primitive grasslands. Where natural grasslands are to be maintained—including all types of prairie—burning usually is required to retard woody plant invasions and rejuvenate native grasses. It should be generally recognized that properly controlled burning is essential technology in managing many kinds of vegetation and the wildlife that depends on them.

Wildlife and Grazing

Historically, around the world, natural vegetation pastured by livestock has been overused and depleted. In North America this condition is being improved as private owners profit from technical assistance and as public agencies get more authority and backing in meeting their broad responsibilities.

Our problems have been particularly acute on arid rangelands, where carrying capacity for livestock has often been overestimated. Rates of stocking, established by tradition or legal allotment, have been gradually reduced, but not enough to prevent

substantial deterioration of the range. Wildlife habitats have been depleted correspondingly. Strong corrective legislation and administrative action are needed.

There are large areas of the Southwest that should not be grazed at all. Originally these lands varied from desert shrub to grassy savanna, and some have been converted by heavy grazing to impoverished brush country. Often their production of livestock is insignificant, but the potential for wildlife and recreation may be much greater. Well situated private owners are realizing good returns from the sale of hunting privileges, and on public lands many kinds of outdoor uses are increasing. More intensive management can enhance these values while restoring lost quality to vegetation and soils.

Well-managed natural rangelands are productive of wildlife—often more productive than grass-brush associations untouched by livestock. Small animal life requires a winter carry-over of adequate cover and seed-bearing plants. Proper rates of stocking by domestic animals and big game will produce more animals per unit than if either were used alone.

On the other hand, wildlife needs particular consideration in land-treatment projects that may result in extensive grass monocultures. The reservation of critical areas from such operations as sagebrush removal can contribute to the interspersion of vegetation types, as will the use of a variety of grasses and shrubs in developing the new range.

Wildlife problems of the western range that have been least satisfactorily handled involve the ecology of rodents and rabbits—their relationship to grazing and to the coyote and other predatory species that feed upon them. Research has made some headway, but more facts are needed for a new appraisal of the most basic factors in long-term management.

Waters and Wetlands

This report can do no justice to the manifold problems of our continental waters. We take note of three that are great issues of the day or have important wildlife implications for the future:

Pollution

In one form or another, pollution is almost universal. It is the greatest limiting factor to the health of aquatic life. Our penalty in declining fisheries and lost recreation is incalculable.

Most insidious for a wide range of organisms is the accumulation in our waters of many kinds of highly stable toxicants. Agricultural uses of persistent pesticides continue at a high level. We commend efforts now being made to phase out such compounds. Solving world problems of food production or disease control does not require relentlessly carrying on with substandard practices. We must find better ways to accomplish the same objectives.

Like technology and population, pollution often builds at geometric rates. On small waters, inland seas, and world oceans it challenges states and nations to action. We have only begun the huge task of setting standards and finding means of meeting them. The commendable work now in progress must be accelerated in every possible way.

Rivers and Floodplains

The artificializing and overdevelopment of North American river systems is proceeding at an annual cost of hundreds of millions. Yet the damage toll continues to rise in floodplains progressively built up under the encouragement of government policy. As thousands of reservoirs receive their yearly deposit of silt, we add to the

huge backlog of economic and hydrologic problems to be faced by generations ahead.

Most of our remaining streams should be left unaltered. Bottomlands should be allowed to perform their natural functions as flood channels and silt-catching overflow lands. Without major investment they can serve usefully as forests, parks, and scenic avenues of wildlife habitat. Far-reaching and basic policy changes are needed.

Wetland Conservation

Marshes, swamps, and wet areas of North America can be described realistically as our most endangered wildlife habitats. A national survey indicated that in primitive times the 48 contiguous states contained 127 million acres of these wetlands and shallow waters. They were a major habitat of migratory waterfowl and local populations of birds and mammals. Coastal wetlands and estuaries are recognized as the indispensable nursery grounds of fin- and shellfish resources. In terms of their yield of living things, these probably are the most productive sites on earth.

Largely within the present century, more than 40 million acres of the continent's best aquatic habitat has been lost through drainage and flood prevention works. Government subsidies to agricultural programs have been directly responsible for much drainage, ditching of natural stream channels, and destruction of bottomland wildlife cover. The reduction of wetland habitats has reached a critical point, and we recommend several steps as the beginning of a constructive program for the future:

There should be a national moratorium on the payment of subsidies that result in a major loss or degradation of aquatic habitats.

In recognition of the valid interests of landowners and the general public, appropriate means should be found to pay farmers, or provide tax relief in lieu of rent, for the maintenance and restoration of wetland wildlife habitat. This should be a cooperative program utilizing the resources and expertise of agricultural and wildlife agencies at federal, state, and local levels.

Opportunities should be explored for creating or restoring water areas along rights of way of federal and state highway systems and on public lands generally.

Additional wetland units should be established in federal, state, and provincial wildlife refuge systems. In urban parks and greenbelts the development of ponds and marshes can bring spectacular concentrations of waterfowl close to the viewing public during migration seasons.

The rapid deterioration of estuarine resources through pollution and development needs greater state and national recognition. Essential surveys and studies should be intensified and zoning restrictions applied pending the development of long-range plans for protecting and improving these important coastal environments.

This committee commends the adoption by states and provinces of laws to zone and control the use of floodways, riparian lands, and aquatic sites.

Wilderness

This word has various meanings reflecting the values sought by people in relatively unaltered areas of land and water. We support a strong wilderness preservation system, with its many wildlife-related benefits. Wilderness has basic environmental and social values, not all of which can be expected

in the same area. Under appropriate conditions these include:

Opportunities for the scientific study of life communities and the processes by which natural ecosystems are renewed. These are the most complex systems of the universe as we know it. Our knowledge of them is in an embryonic stage, and there is application for all that can be learned.

The preservation of species, especially the perpetuation of natural gene pools unchanged by human uses. Of particular value are completely protected areas large enough to support self-contained populations of native carnivores and the plant-eating animals they must prey upon.

Recreational experiences featuring the primitive scene, solitude, and communion with nature.

In practice it will often be possible to restore a "damaged" wilderness to high standard. Native animals that have disappeared may be reintroduced. The effects of minor grazing or forest cutting can be erased, over time, by plant succession. Fire and other natural disturbances should be allowed to initiate new cycles of plant and animal life, as they did before the coming of modern man. The capacity of life communities to regenerate enlarges the possibilities for wilderness in a wide diversity of environments that should be included in the system.

For all of our wilderness a compromising condition must be accepted: In this age of technology the authenticity of a primordial ecosystem probably can not be total. The presence of environmental contaminants and exotic plants and animals is nearly universal.

For guarding and upgrading the quality of designated wilderness we recommend several policies and practices:

The areas should be blocked in as rapidly as possible through acquisition of privately owned lands.

Back-country recreation areas should be established to relieve the growing pressures on wilderness. We endorse the setting and enforcement of recreational use quotas in classified wilderness.

Incompatible uses, such as grazing, mining, or timber salvage, should be prohibited or phased out at the earliest possible time.

In the administration of wilderness, lands and waters of every kind should be under continuing review to identify qualifying areas, especially in types or regions poorly represented in the system. Rare or endangered ecosystems should have highest priority.

Encompassing the projects and programs that may be undertaken at all levels of government, we recognize three categories of wilderness preservation. For individual areas standards of use and management will need to be effectively publicized.

Primitive Ecosystems

We may regard as our "purest" kind of wilderness the rare surviving examples of truly primitive conditions. For the forseeable future these will have premium value for scientific research. Hence, their plant and animal populations should be free of any consumptive use, including hunting and fishing. Areas of this type can tolerate only light recreational use—commonly observational pursuits permitted by foot-trail access.

Our largest areas of primitive ecosystems are in the national parks and certain northern wildlife refuges. For the future there is

need to identify and set aside areas representative of a wide diversity of unique or disappearing environments. Keeping the habitat and wild animal life undisturbed will require a uniform policy and cooperation among agencies.

Recreational Wilderness

In the United States the wilderness system established by federal law in 1964 involves the national forests, parks, and wildlife refuges. The law created a procedure for setting aside largely unaltered areas for the preservation of natural features and for recreation. They will commonly be fished and hunted under state regulation. Hunting is damaging to wilderness values if it is accompanied by illegal killing of nongame animals—predators being especially vulnerable. Where necessary, special protection can be given to diminishing species by designating areas where entry is excluded, as has been done in the case of the California condor. Examples of species that will be benefited by large wilderness areas are mountain lions, wolves, grizzly and brown bears, birds of prey, muskoxen, and desert sheep. Coastal sea mammals and birds are in obvious need of more inviolate areas that include their feeding and breeding grounds.

The standards for statutory wilderness are sufficiently broad to accommodate many new areas—some whose quality will improve with time. Lands of the Public Domain, administered by the Bureau of Land Management, were not recognized in the legislation, and these should be eligible for consideration in the system. The time of dedicating wilderness is short. It should be given high priority in our public land management.

Nature Preservation

We regard it as particularly important in wilderness conservation that provision be made for setting aside choice small areas, ecological types, and units of wildlife habitat that may not qualify in major categories. Commonly such a unit is preserved as a result of local interest. It may be unique and of national significance, or representative of a primitive type that is disappearing —an uncut woodland, a marsh, swamp, prairie, river canyon, beach, dune, or island. Many of these landmarks have particular wildlife values as the refuge of rare species, or as rookeries, breeding sites, or seasonal concentration points.

This kind of nature preservation can be effective at any level of government or private endeavor. Provincial and state natural area systems include a wide diversity of ecological types. These constitute an irreplaceable feature of historic preservation programs. The habitat remnants support populations of declining species and communities having esthetic and educational values—even though such significant animals as the buffalo, eagle, and wolf have long been gone.

HUNTING: BIOLOGY AND SOCIOLOGY

Like its predecessor, this report is concerned in part with hunting and game. It is disconcerting to admit that some of the same problems have been carried over, intact or augmented, for more than 40 years. While we speak mainly of hunting, certain aspects of the following discussions apply also to fishing problems.

Anti-hunting Sentiment

An attitude of many people, seeming to grow with urbanization, is the outspoken antipathy to hunting. It regards nearly any killing of wild creatures as destructive and inhumane, although there has been little objection to fishing on this basis. It is evident that different viewpoints, fostered by

different definitions of right or wrong, can be highly divisive.

In this case, biological facts are much involved. In productive populations of "resident" wildlife there are compensatory relationships between man-caused and natural mortality—one is not added to the other. Thus, a game crop can be taken under properly adjusted regulations, year after year, without diminishing the population. Among migrant species, less is known of mortality relationships, and the job of regulation is more complex. While errors may occur, means of avoiding them steadily improve.

Agencies administering hunting and fishing are committed to seasons and bag limits that protect the resource. All will agree that the taking of wildlife should employ the least wasteful and most humane methods available.

These facts and criteria are routinely applied in responsible management. They should be understood and considered by anyone who renders judgment of this use of wildlife. However, it is true that hunting sometimes is accompanied by practices we cannot condone on any basis.

Indiscriminate Shooting

Public temper is especially short over the killing of nongame animals. For some shooters the season has always been open on birds of prey, species increasingly prized by the nature-oriented public. Any large bird or animal of the roadside has been a likely target.

In deploring these activities, the conservationist habitually weighs words carefully. We emphasize that we are not talking about sportsmen, or even average hunters. We impugn, we say, a hooligan minority of those who bear arms afield. Miscreants who spoil it for everyone.

They do spoil it. Unless far more is done about them soon, public rage could take punitive action against all shooting sports. After 40-odd years of talk, we still know little about the psychology and sociology of the wanton shooter. Corrective action awaits answers to pressing questions:

- Is the individual we describe simply an aggressive outdoor slob, the same who cuts fences and tosses beer cans onto the farmer's lawn? If so, what does this explain?
- Is he acting through ignorance, because someone has not given him facts in word and picture? Is he managing wildlife according to his own misconception (e.g. about predators)?
- Can he be educated? Can he be controlled through any practicable kind of law enforcement?
- What is the annual turnover in individual hunters—recruitment of novices and retirements to other pastimes? What does it mean?
- Should there be qualifying examinations for hunters, standards of outdoor knowledge and gun-handling skills?

We have not approached these unknowns with the tools of modern social science. They demand intensive research. State wildlife agencies, universities, outdoor and conservation organizations, and allied business interests should take the same constructive part in this issue that they have assumed in other phases of wildlife administration and management.

Society should grant and protect the right of hunters and fishermen to take crops of appropriate species under conditions that do not damage the resource. Society should likewise grant and protect the right of all people to enjoy and benefit from wildlife populations unimpaired by the arbitrary actions of a few. Let no one assume that

this is just high-minded theory. Time remaining for effective action is short.

Somewhere and Something to Hunt

Traditionally, hunting as a total experience involves environmental satisfactions: room to roam, quiet, solitude. Hunting at its best cultivates an increasing outdoor sophistication in the individual. He improves his knowledge and enjoyment of nature in all its aspects. He refines his sporting standards, including recognition that quality is poorly measured by the size of the bag.

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.

Problems of access are least in regions of low population. They are greatest in our growing metropolitan areas, and the reasons are evident: Although the cities produce many well-informed and well-organized sportsmen, great numbers of urbanites have been isolated from outdoor traditions. Their landowner relationships are poor, and there are too many of them for the available hunting area. The results of such conditions are predictable:

Dissatisfaction with the quality of sport.
Trespass, property damage, and the posting of land.
Law violations.
Pressures for artificial stocking.

In time immediately ahead, it must be assumed that the area potentially available for hunting will be further reduced. In the past decade urban growth has taken three-quarters of a million acres of rural land annually. We must assume also an increase in public demands for hunting and fishing. At any given time it may not be physically possible to meet this demand. Thus, it is defensible policy to strive first for a quality experience for the individual; secondly, we must serve as many people as possible. A number of means are in use, and to be recommended, for increasing hunting opportunities:

The development of cooperatives to organize landowners and sportsmen for the orderly management of hunting.
Access to commercial forest, utility, and watershed lands and waters as a public relations gesture by corporate interests.
Paid shooting preserves and fishing waters. Dependent on the marketing of artificially stocked game birds and fish, these require special regulations and long seasons. Through suitable licensing, their operations can meet state administrative costs of the program.
Gun clubs and fishing waters maintained for private use. These help meet a part of the total need and should have favorable provisions.
Farms and ranches managed for wildlife and the sale of hunting privileges, often with camping facilities and various services available. Private management of big game, upland birds, and waterfowl has made good progress and should receive technical aid.
Through Federal Aid and other funding sources, active acquisition programs should continue to make more state-owned lands and waters available for recreational use, including hunting and fishing.

NATURAL VERSUS ARTIFICIAL

We propose as a worthy objective in outdoor programs that conditions be kept as natural as possible. However, there are realities to be faced. In areas of high human densities, hunters and fishermen, frequently disappointed, bring organized pressures for something to shoot or catch. Commonly this means pheasants stocked before the gun or catchable-size fish from the hatchery.

Many states have recognized the high costs and limited benefits of such programs. They have resisted "put-and-take" stocking in favor of "investments" in land and water habitat. But sometimes the public clamor becomes political action and produces a legislative mandate. Artificial stocking is then unavoidable.

Operations of this kind have little relationship to the maintenance of wild game or fish populations, and they should not be carried on at the expense of the average license-buyer. For legislators and administrators, it should be a standing principle that stocking for the gun or rod be supported fully by the collection of fees from those who directly participate.

THE USE OF EXOTICS

Almost on a daily basis, men are transporting plants and animals around the earth and introducing new organisms to old habitats. The character of life communities is unavoidably changing. Specialized native forms lose out as broadly adapted exotics take over. This process is degrading the diversity of the natural world. There is no cure for it, but it should be discouraged and resisted.

The importation and use of exotic plants and animals should be under rigid federal and state control. Attempts to establish new species in the wild should be undertaken only after intensive study, appropriate agreements among agencies concerned, and adequate public information. This applies to transfers of North American races and species to ranges not previously occupied, as well as to introductions from elsewhere in the world. Among biological hazards to native wildlife are those of ecological competition, genetic infiltration, and disease transmission. Plant introductions may degrade wildlife habitats, as certain highly successful aquatics have demonstrated.

Under some conditions the stocking of foreign big game, and possibly other species, serves useful purposes on private or commercial preserves. Primary requirements in issuing permits for such undertakings should be that:

The introduced animals can be localized. In case of need, they can be totally removed by known methods.

PREDATORS AND PREY

Administrative and public viewpoints on meat-eating birds and mammals have changed slowly but steadily since early in the century. The high esthetic value of predatory animals is becoming generally recognized. The predator influence on prey species is necessary to the welfare of life communities. The functions are basic: population limitation and the protection of plant food resources; disease control; the culling of least vigorous individuals.

Probably no relationships in nature are subject to unconditional generalizing. But management concepts and policies concerned with predators appear to be developing along lines that can be recommended:

Indiscriminate predator control, applying to species or entire populations, is unwarranted. Bounty payments are wasteful, and seldom, if ever, accomplish anything useful.

Predators have a desirable selective influence in the annual turnover of prey populations. There are long-range objections to managing any game species entirely with the gun.

Predator problems usually are local and temporary. Other forms of wildlife need no general protection from their natural enemies.

Where plentiful predators are hunted, they should have game status for licensing and regulation.

Scarce or declining predators should have legal protection effectively enforced. In cases of property damage, an alternative to eradication should be sought. Possibilities are compensation for damage, or the removal of predators alive for stocking elsewhere.

Predator Control for Livestock Protection

Historically, in the United States the control of wild predators to protect domestic animals has been a cooperative federal-state effort. This is likely to continue. In Canada the several provinces have had independent programs, which are developing common features as new information is applied.

Particularly in the western states, predator control policies and operations are undergoing changes that will make them more acceptable to a public that has become keenly conscious of predator values. Features to be recommended in programs and relationships have become evident, and these should be uniformly applied through cooperative agreements between state and federal agencies:

A basic research program—predominantly a federal function—should establish a fund of information on (1) land-use relationships to rodent and lagomorph populations and the predators that feed on them; (2) the extent of livestock depredations by predators; and (3) the improvement of acceptable control measures to meet verified needs.

The funding of predator management and control should be entirely through federal or state appropriations.

Predator control in the field should be discriminate and minimal, featuring technical self-help aid to landowners, or be carried out by professionals with broad wildlife management training.

Poisoning should be outlawed except for emergency use by qualified personnel.

REGULATORY AND ADMINISTRATIVE PROBLEMS

Useful regulatory innovations have appeared in many states and provinces. We cite, in particular, some that deal with widespread problems or have value in controlling activities regarded by landowners and the public as important abuses.

Vehicles

In the regulation of hunting, the principle of "fair chase" should have legal support. The pursuit, spotting, or killing of wild animals from a motor-driven conveyance, including snow machines, boats, and aircraft, should be prohibited. For the protection of natural values, authority should exist for the administrative control of air traffic by public land management agencies.

On public areas there is no such thing as a legitimate "off-trail" vehicle. Recreational vehicles can be accommodated at appropriate seasons by special trails and by regulations that protect rights of the general public. Noisy or misused vehicles and boats should be excluded from public lands and waters.

Guns

Laws in effect in some states requiring guns to be transported on public property

cased or in the trunk of a car are recommended. This requirement is complementary to regulations prohibiting shooting from or near public thoroughfares.

Trespass

In most regions of private land, access by written permission has advantages for the legal hunter and landowner. In permitting access for recreational purposes, the landowner should have statutory liability protection.

Law Enforcement

Because of the inadequacy of laws, conservation officers often perform their duties at a substantial risk of personal harm and liability. The legal structure under which officers operate should be periodically reviewed and updated by legislative action. Consideration should be given to broadening the police powers of officers, especially where this could be of aid to landowners.

Regulatory Authority

The adoption of effective annual regulations by state wildlife agencies requires flexibility and ready access to technical information. This is accomplished to best advantage when broad discretionary authority is vested in responsible administrators.

The Policy Function

Policies for the management of natural resources are most useful when formulated in anticipation of need by citizen boards and commissions. They are indispensable to both legislators and administrators in defense of the public interest against ill-considered pressures.

Jurisdictions

As a worthy outlook for the future, this committee suggests that state and federal agencies could well be less preoccupied with guarding their spheres of jurisdiction and more attentive to opportunities for cooperation in serving their common causes.

FACTS FOR THE FUTURE

Wildlife policy and operations must be served by sustained and technically sophisticated research. This function is producing well in federal and state agencies and in universities, often carried out on a cooperative basis. Modern research brings together specialists from several disciplines, as needed, to deal with problems in the complex field of environmental science.

The longstanding mission of wildlife research has been to build an understanding of life communities that will contribute to the solution of a wide array of management problems. A good beginning has been made, but it probably is true that only now are we applying truly modern quantitative methods to unlocking the mysteries of living systems. This work will continue profitably as far ahead as anyone can see.

Our most neglected and crucial research needs are those concerning human social behavior. We have noted the problems of the indiscriminate shooter, the trespasser, and the law violator. We have long bewailed our inability to "reach" the general public with facts and create a better understanding of sensitive management issues. We do not yet know the limitations of human densities in outdoor programs. Or how to serve best the long-term interest of the people in decisions of quantity versus quality.

The biologist alone, the social scientist alone, the economists alone cannot deal with these questions. Their combined effort is required, and it must do great things.

PUBLIC RELATIONS AND EDUCATION

This field has been characterized by thinly spread support and minimum services. Its possibilities are closely related to the sociological investigations we have mentioned.

Extension services to the landowner are essential if we are to have his sympathetic interest in cultivating the private and public values of wildlife. While progress has been made, this work is under-funded or ignored in many states.

The information function must deal effectively with citizen organizations, who need program guidance and encouragement to assume their logical role in resource issues of the state and nation.

Federal and state wildlife agencies should have highly professional news and publication staffs. Newsletters, magazines, bulletins, and books have their place in an imaginative and effective public information effort. Movie-making, radio, and television have shown their worth in scattered examples of superior accomplishment.

The related functions of public information and education have a vital part in making and carrying out natural resource policies. They have long since risen above the role of apologizing for administrative blunders. Representatives of wildlife agencies should serve on planning boards along with engineers, economists, and lawyers.

Wildlife and conservation curricula in the universities are training more undergraduates than the present employment market can absorb. This situation will improve as more states upgrade standards and require a college degree for law enforcement officers. In both Canada and the United States employment opportunities for students with graduate degrees have been good, and future needs for basically trained professionals should increase.

Aside from professional training, there is a significant student interest in wildlife and natural resources education. These academic programs are well rounded and especially relevant to the needs of citizens in decades ahead. As a still broader campus service, such a course of study should include offerings in human ecology designed to attract students in non-biological fields.

We strongly endorse environmental education of many kinds in the schools. Teacher training in ecological subjects has lagged far behind minimum requirements if we are to achieve basic goals in human welfare. There is around us abundant testimony that the environmental crisis of today and tomorrow must be met in the minds of children. There is no greater challenge of our time.

OUR THOUGHT

We consider it appropriate to end this report with a statement of our hope and belief for the future:

Mankind emerged from the natural order; we must continue to live as part of it. We have but one earth, our home, our keep, our borrowed estate. We must accept the charge, at whatever cost, to maintain its abundance and guard its quality.

We seek understanding of other living things as the way to an enlightened husbandry of man himself.

We see a future that threatens the idle, the ignorant, the improvident. But we see also, in times ahead, the promise of a good life, if men with wisdom and humility will work for it.

THE COMMITTEE ON NORTH AMERICAN WILDLIFE POLICY

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CALL FOR PAPERS, AND TECHNICAL SESSION CHAIRMEN FOR 39TH "NORTH AMERICAN"

Technical session chairmen of the 39th North American Wildlife and Natural Resources Conference, scheduled for March 31–April 3, 1974, at the Denver Hilton Hotel, Denver, Colorado, have been named by the Program Committee. Anyone having a paper for consideration for presentation during the technical sessions should submit an abstract to the appropriate session chairman promptly. Copies of guidelines for preparing abstracts may be obtained by contacting any one of the chairmen.

Chairman and Mailing Address	Subject of Session
Boyd L. Gibbons, III, Council on Environmental Quality, 722 Jackson Place, N.W., Washington 20006	Advances and Needs in Land Use Planning and Management
Frederic H. Wagner, Dept. of Wildlife Resources, Utah State Univ., Logan 84321	Predators: Research, Management and Policy
William E. Towell, American Forestry Association, 1319 18th St., N.W., Washington 20036	Achieving Balanced Considerations in Public Lands Programs
C. Eugene Knoder, National Audubon Society, 9250 West Fifth Ave., Lakewood, Colo. 80226	Nongame Wildlife: Policies, Responsibilities and Management Approaches
Robert C. Lucus, Intermountain Forest and Range Experiment Station, U.S. Forest Service, Missoula, Mont. 59801	Social and Economic Dimensions in Natural Resource Management
William J. Mullendore, Dept. of Natural Resources, Stevens T. Mason Bldg., Lansing, Mich. 48926	Achievements and Needs in Environmental Information and Education

Dr. John S. Tener, Director, Canadian Wildlife Service, will give a critique of the conference. The theme of the meeting, "Balancing Environmental and Economic Goals," will lead participants into discussions of accomplishments and possibilities in achieving both environmental and economic stability.