

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

---

US Fish & Wildlife Publications

US Fish & Wildlife Service

---

1964

## PREDATOR AND RODENT CONTROL IN THE UNITED STATES

A. S. Leopold

*Advisory Board on Wildlife Management*

S. A. Cain

*Advisory Board on Wildlife Management*

C. M. Cottam

*Advisory Board on Wildlife Management*

I. N. Gabrielson

*Advisory Board on Wildlife Management*

T. L. Kimball

*Advisory Board on Wildlife Management*

Follow this and additional works at: <https://digitalcommons.unl.edu/usfwspubs>



Part of the [Aquaculture and Fisheries Commons](#)

---

Leopold, A. S.; Cain, S. A.; Cottam, C. M.; Gabrielson, I. N.; and Kimball, T. L., "PREDATOR AND RODENT CONTROL IN THE UNITED STATES" (1964). *US Fish & Wildlife Publications*. 254.

<https://digitalcommons.unl.edu/usfwspubs/254>

This Article is brought to you for free and open access by the US Fish & Wildlife Service at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in US Fish & Wildlife Publications by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

PREDATOR AND RODENT CONTROL IN THE UNITED STATES

1.5

Advisory Board on Wildlife Management,  
appointed by Secretary of the Interior Udall

A.S. Leopold (Chairman), S.A. Cain, C.M. Cottam, I.N. Gabrielson, T.L. Kimball

March 9, 1964

In a frontier community, animal life is cheap and held in low esteem. Thus it was that a frontiersman would shoot a bison for its tongue or an eagle for amusement. In America we inherited a particularly prejudiced and unsympathetic view of animals that may at times be dangerous or troublesome. From the days of the mountain men through the period of conquest and settlement of the West, incessant war was waged against the wolf, grizzly, cougar, and the lowly coyote, and even today in the remaining backwoods the maxim persists that the only good varmint is a dead one.

But times and social values change. As our culture became more sophisticated and more urbanized, wild animals began to assume recreational significance at which the pioneer would have scoffed. Americans by the millions swarm out of the cities on vacation seeking a refreshing taste of the wilderness, of which animal life is the living manifestation. Some come to hunt; others to look, or to photograph. Recognition of this reappraisal of animal value is manifest in the myriad of restrictive laws and regulations that now protect nearly all kinds of animals from capricious destruction.

Only some of the predators and troublesome rodents and birds remain unprotected by law or public conscience. In many localities bounties are paid for their scalps, and government hunters are employed for their control. In point of fact, there are numerous situations where control of predators, rodents, and even some birds is essential to protect important agricultural and pastoral interests or human health and safety. The problem is to differentiate those local situa-

tions where control is justified from the numerous cases where the same species of animals have social values far in excess of the negligible damage they cause. The large carnivores in particular are objects of fascination to most Americans, and for every person whose sheep may be molested by a coyote there are perhaps a thousand others who would thrill to hear a coyote chorus in the night. Control programs generally fail to cope with this sliding scale of values. Particularly when professional hunters are employed, control tends to become an end in itself, and following Parkinson's law, the machinery for its accomplishment can easily proliferate beyond real need.

The present report attempts to reappraise the complex problem of animal control, with emphasis on the role played in this endeavor by the federal government. As a basis for the recommendations that follow, the Advisory Board has adopted the following tenets:

1) All native animals are resources of inherent interest and value to the people of the United States. Basic governmental policy therefore should be one of husbandry of all forms of wildlife.

2) At the same time, local population control is an essential part of a management policy, where a species is causing significant damage to other resources or crops, or where it endangers human health or safety. Control should be limited strictly to the troublesome species, preferably to the troublesome individuals, and in any event to the localities where substantial damage or danger exists.

It is the unanimous opinion of this Board that control as actually practiced today is considerably in excess of the amount that can be justified in terms of total public interest. As a consequence, many animals which have never offended private property owners or public resource values are being killed unnecessarily.

The issue is how to sharpen the tools of control so that they hew only where cuts are fully justified.

#### EXISTING CONTROL MACHINERY

The existing organizations and programs for controlling vertebrate pests are complicated almost beyond belief. There is no single agency of responsibility. Central to the whole undertaking, and playing a major part in the control of predatory mammals, is the Branch of Predator and Rodent Control of the U. S. Fish and Wildlife Service. This Branch likewise participates under certain situations in the control of rodents, pest birds, and small carnivores carrying rabies. But this is only the beginning. Most states have control programs of their own, administered through departments of agriculture, fish and game, public health, university agricultural extension, or combinations thereof. Many county governments have rodent control programs and some conduct predator control as well. Livestock associations often contribute to control programs at the county, state and federal level. Bounties are still paid by a number of states and counties. Fortunately this obsolete practice is on the wane, but Michigan, for example, still spends nearly a quarter million dollars a year for bounty payments. Finally, there are the countless individual ranchers and farmers who take control into their own hands when they cannot get some agency of government to do the job for them.

Perforce, much attention in this report is directed to the activities of the federal Branch of Predator and Rodent Control, partly because the Secretary specifically invited comment on this activity within the Department of the Interior and partly because it is the only cohesive, organized unit whose activities touch a large part of the country. But we recognize that problems of over-control are generated in considerable part through state, county, and local programs, which

fall outside the legal jurisdiction of the federal government but contribute to the overall problem nonetheless.

The federal program of the Branch of Predator and Rodent Control (hereafter referred to as PARC) is financed cooperatively with many other agencies and organizations. In recent years the total program has expanded from about a \$3 million operation in the early 1950's to approximately \$6 million now, due more to rising costs than to increasing manpower. Roughly 90 per cent of the money is spent in the dozen states west of the great plains, from Montana and Texas to the Pacific. The proportional contribution of PARC has remained at about 40 per cent, the balance coming from other federal bureaus, state and county governments, and livestock associations. In some states, as in Oregon, Utah, and Nevada, a special head tax on sheep is assessed to supply this cooperative contribution. In others, the money comes from general appropriations. Several state legislatures have appropriated fish and game license funds for this purpose, often without the voluntary consent of the Fish and Game Commission or Department, whose funds are thus expropriated. County funds usually come from general appropriations, but in California a number of counties have been utilizing fish and game fine monies ear-marked for wildlife management. Many livestock associations contribute working funds, and some individual ranchers put up money for which, of course, they expect control on their own ranches. The whole pattern of finance is a complex one.

There are sound arguments in favor of a centrally directed federal program to which interested parties contribute operating funds. The centralized program is far more efficient in terms of proper distribution of manpower, use of relatively safe and effective control methods, and in results per unit cost. Local financial participation certainly denotes a level of interest which would not be

the case if the program were completely a federal subsidy, without local investment. On the other hand, there is one substantial disadvantage to the cooperative type program, namely, that the local cooperating agencies have a major voice in determining where, when, and how much animal control is to be undertaken.

One of the first questions to which this Board directed its attention was to seek criteria which govern decisions on control. Marauding animals cause damage, and decision on control would logically bear a direct relationship to the amount of damage being caused, as expressed in dollars lost, or per cent of the lamb crop taken, or some other objective measure. We found a great paucity of such data, and in many cases they seem to play little if any part in decision making. Rather, control decisions appear to be based on the subjective judgment of PARC field men or supervisors in conference with livestock operators and agricultural officials. Some PARC administrators show remarkable discretion in encouraging only sound local programs and resisting marginal or spurious proposals, but we have abundant evidence that others willingly support almost any control proposal in which someone is enough interested to contribute matching funds. The determining criterion, therefore, frequently is a matter of finance and of "program building" rather than need.

In short, the federal predator and rodent control program is to a considerable degree shaped and designed by those who feel they are suffering damage from wildlife. Too often PARC personnel support and encourage control decisions without critical appraisal. At times they are known to solicit requests for control and to propagandize against predators as a basis for such solicitation. There is no mechanism to assure that the positive social values of wildlife are given any weight in decision making nor that control, when it is undertaken, will be limited to minimal needs.

The unilateral nature of the PARC program, and its firm entrenchment as a

protective subsidy of livestock and agricultural interests, have invited criticism and distrust from many groups and individuals interested primarily in wildlife protection, including many ranchers. There have been numerous investigations and reassessments of the function of the federal government in animal control, of which this is only one. Essentially all have concluded, as have we, that some control is necessary and that a federal program associated with the Fish and Wildlife Service (rather than the Department of Agriculture) is the best plan of organization. But it has become increasingly clear over the years that some review mechanism is required to protect animal life against unnecessary or excessive control and to assure that the interests of the public at large are duly considered, as well as the interests of agriculturalists and livestock operators. Such a mechanism is proposed in a later section of this report.

#### PREDATOR CONTROL

##### Damage caused by predators

The primary target of predator control in the western United States is the coyote, and the main purpose of coyote control is to protect domestic sheep. The total number of sheep in the eleven western states has decreased slightly in the past decade, from 12,527,000 in 1952 to 12,293,000 in 1961. Much more marked has been the decrease in numbers of sheep grazed on public land. In 1952, 8,311,000 sheep were permitted use of grazing lands administered by the Bureau of Land Management; by 1961, this number had declined to 6,696,000. During the same period, use on Forest Service land decreased from 3,006,000 to 2,491,000. The decline of the western sheep industry is due in part to low prices for lambs and wool and, in part, to increasing costs of labor, particularly involving herding. There is a definite tendency to keep more sheep in fenced pastures on private land and to send fewer flocks afield to graze under the custody of herders. Whereas the decrease in the sheep industry as a whole would suggest a lessening need for coyote

control, the shift to pastured sheep without herders counteracts this, since unherded sheep are highly vulnerable to predation. In those localities where sheep are a major commodity, there is still definite need for control of the coyote population. But sheep localities are shifting from the mountains and open range to privately owned valleys and foothills.

In our quest for substantive data on sheep losses to coyotes, we obtained fragmentary records from PARC and others from Wool Growers Associations verifying that local losses sometimes are severe. But the only extended record expressing trends in the sheep industry, predator losses, and costs of predator control were obtained from four western regions of the Forest Service. The data cover the years 1941 to 1962, but we have summarized in Table 1 merely some of the pertinent statistics for the last year, 1962. It can be seen that on the national forests at least, the total cost of control exceeds the value of the sheep lost during the summer grazing period (and it is traditional for sheepmen to charge nearly all losses to predators.) In Region V, for example, which includes 18 national forests in California, the value of sheep lost in 1962 was \$3,501.00 and the cost of predator control on national forest lands was \$90,195.00. Admittedly, losses would have been higher without coyote control, both on the forests and on adjoining private ranges. The issue is, how much of this control is really justified? Most of the 64,743 sheep now grazed on national forests in California are concentrated in the northern and eastern forests, yet traditional coyote control programs are continuing in other areas where few if any sheep are now pastured and where recreation is acknowledged as the primary use of forest lands. On many California forests the esthetic value of coyotes greatly exceeds any potential damage that they might cause. Although the PARC program in California is exceptionally well administered, there seemingly is no mechanism for re-evaluating the goals of predator control in the light of chang-



Table 1. Statistics of sheep grazing, predator losses, and costs of predator control in four western regions of the U. S. Forest Service for the year 1962.

USFS Region	Sheep <sup>1</sup> Grazed	Sheep <sup>2</sup> Lost	Per- centage Sheep Lost	Value <sup>3</sup> Sheep Lost	Cost of <sup>4</sup> Control
I	153,788	1,435	.9	\$ 24,784	\$ 20,044
IV	1,143,219	12,630	1.0	218,120	142,902
V	64,743	223	.3	3,501	90,195
VI	116,223	1,116	.9	<u>19,273</u> \$265,678	<u>37,908</u> \$291,049

<sup>1</sup>For average period of 3 months in summer.

<sup>2</sup>All losses charged to predators.

<sup>3</sup>Sheep values figured from Statistical Bulletin No. 333 and 230, USDA Agric. Marketing Service.

<sup>4</sup>This figure represents cost of control work on Forest Lands.

ing public values.

In some localities, the control of coyotes is justified on the basis of protecting calves from predation. We have scant evidence as to the extent of calf predation, although it is said to be serious in certain neighborhoods in Nevada, Arizona, and Texas. In great areas of the West, cattle and coyotes seem to live amicably together, with no reported losses whatsoever. On rangelands occupied only by cattle, and not used by sheep, it is the opinion of this Board that there is little justification for general coyote control, and it should be undertaken only in localities where substantial calf losses are established on a basis of irrefutable evidence.

Poultry ranches are subject to severe predator losses at times from a variety of animals, including particularly bobcats, coyotes, and raccoons. Usually, however, these losses are highly localized and control in the immediate vicinity of a turkey ranch, or large chicken farm, effectively eliminates damage. General control programs applied over large areas are rarely justified.

Other animals taken in PARC predator control operations are enumerated in Table 2. Some of these, as for example most of the bears and beavers, represent individual animals that are creating pest situations. Foxes, raccoons and skunks are killed largely in rabies control operations, to be discussed shortly. Bobcats are widely killed, though the damage they cause is highly local and in many areas negligible. But a great many of the animals enumerated in this table are taken inadvertently as innocent victims of the control operation. This certainly applies to most of the badgers, opossums, and some of the bears, foxes, raccoons and skunks. Porcupines are killed to protect timber values, and this seems to be true in areas where porcupine damage does not occur as well as areas where damage is known. Additional to this list, and not recorded for obvious reasons, are the other inadvertent victims, including deer, domestic dogs, eagles, vul-

Table 2. Animals taken in federal and supervised-cooperative control operations in the United States, fiscal year 1963.

Predators

Bear	842
Lynx and bobcat	20,780
Coyote	89,653
Mountain lion	294
Wolf	2,779 <sup>1</sup>

Other animals

Badger	6,941
Beaver	1,170
Fox	24,273
Opossum	7,615
Porcupine	6,685
Raccoon	10,078
Skunk	19,052
Miscellaneous	<u>601</u>
	190,763

<sup>1</sup> Including 2774 animals taken in Texas and Arkansas and classed as red wolves, though most may be coyotes.

tures, and perhaps occasionally valuable furbearers such as pine martens.

In a good many areas where there is no livestock, or at least damage is not being reported, PARC conducts predator control on the grounds of protecting native wildlife. The assertion that native birds and mammals are in general need of protection from native predators is supported weakly, if at all, by the enormous amount of wildlife research on the subject conducted in the past two or three decades. Predators patently catch some birds and mammals of practically all native species, and there are local situations where predator control can be justified. But it does not follow that predation is necessarily a factor determining average population levels, nor that generalized predator control is an effective form of management. In the opinion of this Board, predator control for the protection of other forms of wildlife should be undertaken only after competent research has proven it to be desirable and locally needed. Many situations have come to our attention where control is conducted on the assumption of benefit rather than on proof of need. As one example, we cite an extensive program of coyote poisoning on the Cabeza Prieta Game Refuge in Arizona in the absence of any acceptable evidence that it is needed to protect the native bighorn or any other form of wildlife. In short, some of the damage on which predator control programs are predicated may be far less serious than is purported. Much of the existing control program could be eliminated while continuing to offer completely adequate protection to critical needs of livestock, poultry, and in a few situations to wildlife.

#### Predator control methods

When control is deemed necessary, it is important that the methods chosen be precise and selective. No method is acceptable if it results in the inadvertent death of a great number of animals during the process of killing a few that are causing damage. Efficiency, selectivity, safety, humaneness,

and reasonable cost are the principal criteria which we have applied in evaluating the various methods of predator control.

In the open areas of the western United States, by far the most efficient control method for coyotes is the 1080 bait station. The station normally consists of a dead animal, such as a sheep, in which compound 1080 (sodium fluoroacetate) is injected. According to PARC ground rules, these stations are to be placed no more frequently than one to a township; their presence is to be clearly announced with posters; and thirdly, they are to be established late in the autumn and picked up early in spring so that they are only effective in the winter months. They operate on the concept that coyotes travel widely in their foraging, and any point within a township (36 square miles) will probably be passed sooner or later by resident coyotes. On the other hand, other carnivores and scavengers are very much less mobile, and the only ones that may be exposed to such a station are those living in its immediate vicinity. Most of the summer carnivores and scavengers migrate or hibernate in winter. When properly applied, according to regulations, 1080 stations of this sort do an effective and humane job of controlling coyotes and have very little damaging effect on other wildlife.

On the other hand, we are aware of a good many instances where regulations are not followed and where 1080 stations are placed much closer together than they should be, excessive doses of poison are used, and the poisoned bait is not always picked up in the springtime. Abuses of the regulations are condoned in some PARC districts. Under these circumstances, considerable damage can occur to other forms of wildlife as well as to domestic dogs. However, if regulations for the placement and treatment of 1080 stations are strictly followed, we agree with PARC that it is perhaps the most efficient and one of the least

damaging methods of coyote control in open lands of the western United States. But there is need for much stricter adherence to the operational rules specified in the Manual.

Two completely specific methods of coyote control are shooting from airplanes and calling and shooting on the ground. Where justified, airplane hunting can be used to take the troublesome individual animal. Calling coyotes and bobcats has come to be an important sport in parts of the southwest, especially in Arizona. Wherever sport hunting can be utilized to reduce the numbers of damaging predators, this certainly should be preferred over killing by professional hunters. In fact, sport hunting of carnivores on a sustained yield basis is a highly desirable form of resource use.

The cyanide gun, or "coyote getter," is an effective but considerably less selective tool for eliminating coyotes. A number of other animals besides coyotes are known to be killed by these devices and they may be dangerous to human life as well. Although we do not recommend the elimination of the cyanide gun from the control arsenal, we do strongly recommend its use with extreme caution and only in situations where more selective methods are inapplicable.

Curiously, the steel trap which is the most widely accepted method of controlling predators is one of the most damaging in the sense of being non-selective. Trapping stations baited with either scent, carrion, or both, may randomly take coyotes, bobcats, badgers, foxes, raccoons, skunks, and various lesser animals. Much of the unnecessary and unjustified killing of wildlife in the western United States is the result of the use of steel traps set for coyotes. Despite this severe limitation, the steel trap is relatively safe for human beings, dogs (which can be released), and livestock, and as such is the most acceptable method to be used in heavily settled country, where poison in any

form would be dangerous. We therefore must accept its use in many situations throughout this country.

One control method for predators that we suggest be deleted entirely is the broadcast distribution of poison baits. This certainly is the least selective control method with a maximum potentiality for damage to other forms of wildlife and it seems unjustifiable under any circumstances.

Another method of predator control for which we can find no justification whatsoever is the payment of bounties. Despite repeated studies which have demonstrated the futility and wastefulness of bounty payments, a distressing number of states and counties still make such payments. Fortunately, this is one foible that the federal government somehow succeeded in avoiding.

Most of the methods of predator control which have been developed by PARC are found acceptable to this Board if field application strictly follows Service regulations. Firm supervision is required to enforce these regulations in all districts, not just in some of them. We take more serious issue with the extent of predator control than with the methods used.

#### RABIES CONTROL

##### The danger

Because rabies is such a terrifying disease, its discovery in a community brings consternation to the public and to government agencies as well. Among the carnivorous animals known to serve as a reservoir for rabies, some of the more prominent are wolves, coyotes, foxes, raccoons, and skunks. Where rabies outbreaks have been detected among these animals, it has been frequent in recent years to call in the control machinery of PARC on the assumption that control of the reservoir population will hasten the termination of the epizootic, or at least will reduce the danger to humans and domestic livestock. Scientific proof

of this assertion is lacking. Active control of foxes, raccoons, skunks and opossums in an area of Virginia, where rabies was occurring occasionally in domestic stock, failed to offer conclusive evidence that control led to a reduction in rabies. (J. Amer. Vet. Med. Assn., Vol. 1043 [2]: 170-177, 1963). Likewise, public health officials in California and Arkansas expressed to us the opinion that inoculation of domestic dogs and cats was more effective than wild animal control in suppressing rabies. Pending more conclusive studies, it can be expected, however, that severe outbreaks of rabies invariably will lead to animal control programs.

Important issues to be determined are: 1) Will reduction of populations of small carnivores actually help in controlling rabies outbreaks, and 2) at what level of incidence should control be undertaken? Individual rabid animals may be encountered from time to time almost anywhere in North America, but how many cases of rabies should constitute valid justification for undertaking a control program?

An outbreak of rabies does not ordinarily justify a long-continued program of animal control in any given locality. Outbreaks flare up and disappear in widely separated localities and may not recur again for long periods. This would suggest the desirability of PARC maintaining "flying squads" or highly mobile units designed to cope with outbreaks wherever they may occur, but avoiding the establishment of long-term or semi-permanent control programs in any given locality when the need for such control usually is ephemeral.

#### RODENT CONTROL

In the western United States the control of pest rodents has in times past been a major activity of PARC and local agencies as well. In some areas it is



still a large operation. Pest rodents, under many situations, can have substantial impact on agricultural crops or on pasture lands. In the arid west, serious outbreaks of rodents sometimes are a direct result of land misuse, particularly overgrazing. Long-term cure for this situation is better grazing practice, since rodent control of itself is not the cure but an attempt to cope with a symptom. Nevertheless, under existing land use practices, some rodent control is essential for continuing agricultural operation and sometimes for range re-seeding and rehabilitation.

The federal government, through PARC, contributes to the rodent control program in most of the western states and in a few of the states of the midwest. In 1963, PARC spread poison baits for rodent control on 260,000 acres of federal land and 1,100,200 acres of state and private land. This is a great reduction from the era of a decade ago when millions of acres were poisoned annually, mostly for prairie dogs.

This operation is supplemented each year by rodent poisoning programs conducted by agricultural departments of state and county governments and by individual farmers and ranchers. We have no measure of the millions of acres treated per year by these other agencies and individuals but it probably exceeds the program conducted by PARC.

One of the anomalies of the rodent control program in general is its heavy dependence upon 1080 as a principal poison. Grain mixed with 1080 is a deadly bait for prairie dogs, ground squirrels, gophers and other rodent pests. However, many of the animals thus killed end up on the surface of the ground where they are readily available to be consumed by carnivores and scavengers of all sorts, leading to the secondary poisoning of this latter class of animals. Factual data measuring the inadvertent killing of innocent animals through this mechanism are

sadly lacking, but there is a great deal of indirect evidence suggesting that it is important.

In 1963, PARC distributed approximately a quarter of a million pounds of treated bait for rodents, and of this amount over 150,000 lbs. was treated with 1080. It is curious that PARC will distribute great quantities of 1080 treated grain (sometimes by airplane, as in forest reseeded projects) in exactly the same areas where they take elaborate precautions in their predator control program to protect carnivores other than the target species. Secondary poisoning of scavenging animals by rodent bodies bearing 1080 can have heavy impact on small carnivores and some birds in treated areas. In many regions of the western United States where there are no sheep and where coyote damage is negligible, the coyote nevertheless has been essentially extirpated from treated areas as a secondary result of rodent control programs. In addition to coyotes and badgers, uncounted numbers of bears, foxes, raccoons, skunks, opossums, eagles, hawks, owls, and vultures are exposed to possible secondary poisoning in these programs. In some localities 1080 treated grain is used in forests to kill rodents that may be prejudicing forest reproduction with resultant exposure of many animals to the poison.

Some of the rare species in North America may be endangered by this type of program. The black-footed ferret in the northern Great Plains is nearing extinction, and the primary cause is almost certainly poisoning campaigns among the prairie dogs which are the main prey of the ferret. In the fall of 1963 two dead California condors were picked up in an area that recently had been poisoned with 1080 grain to reduce the population of ground squirrels. This operation was conducted by agricultural interests in Kern County, California. The circumstances surrounding the death of these birds and laboratory tests conducted at the Univer-

sity of California on the remains of one of them suggest that the condors died of 1080 poisoning, acquired from eating dead ground squirrels. The condor is a vanishing species and it is unthinkable that this sort of mistake can be permitted to recur. Some 1080 poison distributed by the Pan-American Sanitary Bureau (through a cooperative arranged with PARC) for use in the northern states of Mexico is known to have killed several grizzly bears from the small surviving remnant in the Sierra del Nido, Chihuahua. These are the last grizzlies in the arid southwestern North America.

In short, secondary poisoning of unintended victims by 1080 distributed primarily for rodents is, in the opinion of this Board, a major problem in animal control which requires regulation. It is our recommendation to the Secretary that legal means be explored to ban the distribution and use of 1080 as a poison for field rodents. As noted in a subsequent section of this report concerning research, there may be released in the near future other highly effective rodenticides which do not have secondary poisoning effects on carnivores. Until such time as these are available, we recommend that rodent control be conducted with strychnine or other chemicals which are not readily transmitted to scavenging animals.

#### CONTROL OF PEST BIRDS

One of the most difficult of control problems is that concerning birds which gather in great flocks and cause damage to grain fields, fruit crops, or other agricultural resources. Various species of blackbirds, for example, have serious impact on rice fields in Arkansas, Louisiana, Texas, and California and on sweet corn and truck crops in New Jersey, Delaware, Maryland and Virginia. The introduced starling is becoming a major pest, not only in grain fields, but in livestock feed lots, in holly groves of the Northwest, and in fruit crops, particular-

ly in western irrigated valleys. Some small birds, which are normally considered songbirds, as for example the linnet, under some circumstances can create havoc in fruit crops such as cherries. There is a growing problem of controlling flocking birds on jet airports. Crashes of passenger-carrying planes at takeoff or landing have been definitely attributed to encounters with flocks of birds.

To date, the Fish and Wildlife Service has been properly conservative about initiating mass control programs for pest birds. A good deal of study of the problem has been conducted by the Wildlife Research Branch and some experimental control has been undertaken by PARC. This Board feels that the Fish and Wildlife Service is better equipped than any other agency to assist in the development of methods to control bird damage, but we have serious doubts about the desirability or the necessity of the Service assuming a major role in actual control programs. Most depredations on crops are highly local in occurrence, are ephemeral in the sense of shifting rapidly from one property to another, and are limited largely to crops subject to rather intensive husbandry by private landowners. Under these circumstances an action program by individual farmers is generally more practical than a government control program which could not conceivably adjust fast enough to follow the day-to-day movements of marauding bird flocks.

As regards methods of controlling bird damage, we feel that much more attention should be devoted to repellants and scare-devices and less to procedures for killing birds. There is a growing field of bio-sonics which might be developed to frighten birds from vulnerable crops by broadcasting distress calls or alarm notes. Methods and equipment are still rather primitive, but considerable success has been achieved in driving away such species as starlings, blackbirds, and grackles. In many cases depredations occur during brief periods of crop

vulnerability, as for example when horned larks nip sprouting lettuce seedlings, blackbirds attack grain in the milk stage, or robins descend on cherry orchards at harvest time. Much damage could be prevented by frightening the birds away during the brief danger period, and with proper methods and equipment a private farmer or rancher could attend this duty far more effectively than a government employee.

Under certain circumstances birds may have to be destroyed, some cases in point being winter concentrations of starlings in holly groves, in cattle feed lots, or around airports. But these again are local situations, best taken care of by individual owners or administrators, using methods approved and supervised by the Fish and Wildlife Service. Again, specificity of control is a primary objective.

An unusual problem of current interest is the alleged depredations on sheep and goats by golden eagles in western Texas. Livestock operators have complained bitterly about losses which they attribute to eagles, and in years past substantial numbers of eagles have been shot from airplanes under subsidy paid by the ranchers. At the same time, the golden eagle is one of the most interesting of American birds of prey, and the winter concentration of these birds in Texas represents a substantial segment of the population occupying the west-central portion of North America. Current federal regulation protects all eagles from persecution, and although this Board has not intensively studied the problem in Texas we urge the Secretary to continue the protected status of the eagle until the facts of the case are thoroughly understood. With adequate knowledge, many vexing problems of depredation have been alleviated by methods other than wholesale killing.

To summarize our recommendations on bird control, we envisage the role of

the federal government as primarily research, extension, and regulation of methods rather than actual control.

#### RESEARCH ON CONTROL METHODS

The U. S. Fish and Wildlife Service maintains two wildlife research centers, one at Patuxent, Maryland and the other at Denver, Colorado. Much of the research directly concerned with the control of pest animals is centered in the Denver Laboratory in two sections, one concerned with Biochemistry and Pesticide-Wildlife Relations, and the other with Control Methods. A number of other agencies are involved in research on animal control, including state universities and state departments of agriculture, public health, and fish and game. But the Denver Wildlife Research Center is far and away the most important single institution concerned with predator and rodent control.

Among its many functions, one of particular concern in relation to this report is the search for more effective methods of preventing animal damage and for more specific methods of animal control. Thus, chemical compounds produced in industrial research laboratories are constantly being tested as to their toxicity to animals and their possible use as repellants or as controls. There is being tested at the present time a formulation known as DRC 714 which shows promise of being highly toxic to rodents, with a low toxicity to birds and carnivorous mammals. If this, or some other formulation, can be found which will be an effective poison for rodent control without danger of secondary poisoning to other animals that consume the bodies of the poisoned rodents, a great stride forward will have been made. Additionally, the Center is working on the possibility of developing birth control methods that may effectively limit a population of a pest animal such as the coyote without the necessity of killing any individual. Thus, the chemical stilbestrol, which in very small oral dosage is known to pre-

clude reproduction in ranch mink, is showing some signs of being effective also in eliminating litter production among female coyotes. Possibly the application of stilbestrol baits during the coyote breeding season in areas where coyotes must be controlled could be a way of accomplishing the objective without causing the death of any animals, coyotes or others.

Another area of investigation which has been pursued intermittently at the Denver Center is the study of predator-prey relations, particularly those involved between coyote populations and pest rodents. The continuing argument about whether coyotes and other predators really regulate rodent populations has been conducted over the years with more heat than light, and only now the Denver Wildlife Research Center is bringing its skills to bear intensively on this problem. Rodent populations are being compared on sites where coyotes are controlled and other sites without control. Past and current studies suggest that rodent populations, like game populations, are more a function of habitat conditions than predator pressure.

There are other areas of research which are not at the moment being undertaken by either the Denver or Patuxent laboratories and which this Board feels may be important. One is a study of rabies outbreaks in relation to the control of small carnivores that act as reservoirs of the rabies virus. A great deal of animal control is pursued on the basis that it is necessary in the control of rabies, but the facts regarding this situation are scant indeed. It would seem most appropriate for the federal research centers to undertake the study of this problem, perhaps in conjunction with public health services of either state or federal governments.

Another line of research that would be important in evaluating the control program of PARC is a socio-economic study of cost-benefit ratios of the predator

and rodent control programs. Again, these control campaigns are being conducted on the tacit assumption that they create important beneficial results, but no one has actually measured the results in terms of social and economic gain, as evaluated against cost. Such an approach would have to attach positive consideration to the esthetic, recreational, and ecologic values of animals as well as to measure the negative and destructive values.

We further recommend that the research program shift some of its attention from methods of killing animals to ways of preventing depredation by repelling, excluding, or frightening animals. In the case of ducks, quail, pheasants, deer, and other game species ways have been found to reduce crop and garden depredations by means other than wholesale killing, although local control sometimes is a final necessity. With ingenuity, perhaps the same objective could be achieved, at least in some situations, in alleviating problems caused by coyotes, foxes, bears, eagles, blackbirds, and other troublesome, non-game species.

Lastly, we urge a thorough and unbiased study of the economic status of the golden eagle, particularly in its relation to the sheep and goat industry. There is need for much more knowledge about the true effects of predation on sheep and goats and a better understanding of the relationship of predation to range conditions, general health of the livestock flocks, and to the variable of weather. We also need much more information on the natural history and population dynamics of the eagle.

These are only a few of the research projects that need to be pursued and are highly pertinent to the questions being dealt with in this report. We are gratified to note a substantial growth in the technical staff of the Denver Wildlife Research Center in the period between 1958 and 1962. Because of the importance of the research work, it is the hope of this Board that the Denver labora-



tory and the Patuxent laboratory in the East as well, can continue to obtain additional support to carry on their functions.

#### RECOMMENDATIONS

1. Appointment of an Advisory Board on Predator and Rodent Control

Our first recommendation is that the Secretary of the Interior appoint an Advisory Board on Predator and Rodent Control which will be a continuing body comparable to the Advisory Boards on National Parks or Water Resources. Such an Advisory Board should include carefully selected individuals representing the livestock and agricultural interests, conservation organizations, and technical organizations such as the National Academy of Sciences, American Society of Mammalogists, American Society of Range Management, and the Wildlife Society.

The Board would be advisory to the Secretary and would serve the important function of being a forum for the wide spectrum of opinions regarding where, when, and what animal control should be undertaken. It is not expected that such a diverse group would always reach a consensus. But at least the Secretary would be made aware of sensitive problems and divergent viewpoints, which at present he is not.

As the situation stands now, appeals of all sorts regarding animal control programs are referred to the Fish and Wildlife Service and generally thence to PARC. If the appeal is for more control in a given locality, a sympathetic audience is assured. If, on the other hand, the plea is one of complaint against excessive control the PARC reacts defensively, and as a rule the complaint is stifled in one way or another. There exists no unprejudiced, objective body that receives and weighs these diverse views and opinions and that can advise the Secretary on the pros and cons of difficult issues. Although final authority regarding the regulation and management of animal control programs should remain with

the Secretary of the Interior, we feel that an Advisory Board would keep him far better informed than at present about the diverse social values involved in various control cases and how these should be handled in the interests of the American public as a whole.

2. Reassessment by PARC of its own goals

Our second recommendation is that the Fish and Wildlife Service and its Branch of Predator and Rodent Control completely reassess its function and purpose in the light of changing public attitudes toward wildlife. There persists a traditional point of view that the PARC operation is responsible primarily to livestock and agricultural interests, and that the growing interest of the general public in all wild animal life, including predators, is a potential obstruction to the progressive control program and is to be evaded and circumvented wherever possible.

In point of fact, the segment of the public interested in husbandry and wise use of all animal resources represents a substantial majority and can no longer be suppressed. Even in farming and ranching communities there is a growing reaction against unwarranted killing of animals not actually creating a problem. A clear example is the organization of the Toponas Valley Grasslands Association in central Colorado. Ranchers in an area of 350,000 acres formed an association to protect coyotes and smaller carnivores from poisoning by the PARC. Another symptom of change is the introduction in the House of Representatives of H.R. 9037 by Mr. Dingell, on November 6, 1963. This bill clearly defines the positive values inherent in populations of wild carnivores, and to protect these values proposes to strip PARC to a skeleton crew whose function is extension rather than actual control. Unless the government control program undergoes a drastic and critical internal revision of operational objectives and procedures,

an even more drastic revision will sooner or later be forced by the public, with possible serious curtailment of the control functions which we concur are locally important.

As stated early in this report, the goal of PARC should be to control animal damage on an absolute minimum basis consistent with proven needs to protect other resources and human health. Control that exceeds minimum is contrary to the public interest, and in the long run may prove contrary to the interests and even the continued existence of PARC.

### 3. Suggestions on PARC Operations

On the open grazing lands of the West we feel that the present form of PARC organization is the most efficient form of predator control. But there is need for explicit criteria to guide control decisions, something that we find sadly lacking at present. Under properly enforced regulations and constraints the team of trained professional hunters can certainly achieve control with maximum efficiency and potentially with minimum damage to other values. Likewise, we acknowledge the necessity of continuing the cooperative program in which at least 50 per cent or more of control funds are supplied from non-federal sources. On the other hand, the justification for each local control program should be documented far better than at present, and such proof of need should be available when requested by the Advisory Board or the Secretary. The mere appeal for additional control by local groups of ranchers or the offer to help pay for a control program by a county or state is not of itself deemed justification that the program should be undertaken. As a form of justification, narrative descriptions of damage should be supplemented with quantitative statistics on the true extent of damage.

On the farmlands of the midwest and east the need for federal control per-

sonnel is far less clear. We see little justification, for example, for the ambitious PARC program in Arkansas. In Missouri, Kansas, and a number of other agricultural states, extension trapper specialists are utilized to work with farmers and teach them how to cope with their own problems of predator and rodent control. We would recommend therefore that in the eastern half of the United States (generally from the Atlantic westward to approximately the 98th degree longitude through eastern North Dakota and eastern Texas) the plan of government control personnel be supplanted with a program of federal extension trappers to be stationed in those states that request such cooperative service. Costs should be met on a matching basis with the states, and it is our strong recommendation that state funds be drawn from general appropriations in support of agriculture and not from Fish and Game license money. We further recommend that such extension programs be developed to replace rather than to augment bounty systems which are completely futile and unnecessary components of predator control.

Lastly, there should be maintained in the eastern portion of the country flying squads of federal control agents whose particular function is to deal with mammalian populations in areas where severe rabies outbreaks or other similar problems develop. We see no proven need at the present time for permanently established and entrenched programs of rabies control when rabies seems to be such an ephemeral disease in the wild.

#### 4. A Greatly Amplified Research Program

A well staffed and strongly supported research program can greatly enhance the effectiveness of the federal endeavor to minimize animal damage. For many years research in this area was given little attention by the Fish and Wildlife Service. We note with satisfaction the recent increase in support of the Denver and Patuxent laboratories, but this can be further extended with profit

and ultimate savings to the government. We particularly would like to see emphasis on (1) finding more specific controls for pest species, thereby minimizing unnecessary killing of innocent animals, and (2) development where possible of repellants, fences, and scare-devices which would preclude the necessity of killing any animals. The research could well be financed out of savings resulting from curtailment of the present PARC program.

5. A New Name for PARC

We have suggested a number of changes in basic policy and philosophy of the Branch of Predator and Rodent Control. Another name for the Branch might better express this new concept, both for the public at large and for the personnel concerned. Although control will continue to be a major function of the Branch, there is implied a much broader responsibility for management of animal life in ways other than killing. We therefore recommend that consideration be given to the selection of a new name for PARC that clearly connotes a broad management function.

6. Legal Controls Over the Use of Poisons

As stated earlier, much of the damage to wildlife that is accruing at present from control operations seems to occur in the form of secondary poisoning following 1080 programs against rodents. At present there is no legal machinery to prevent a county or municipality from acquiring and using 1080 in any way it sees fit. The regulations state merely that 1080 cannot be distributed to individuals but can be purchased and used by any authorized government agency. We see no way to regulate the damage caused by many local rodent control poison campaigns, other than through strengthened federal law and procedure governing the use of these poisons. The situation is parallel in some ways to the problem of regulating careless use of insecticides. There are rigid rules guarding public

health and safety, but the safeguards against ecological abuses are weak and ineffective. We recommend to the Secretary of the Interior that this question be explored with the Federal Pest Control Review Board. The purpose should be to regulate the distribution and use of 1080 or any other poison capable of having severe secondary effects on non-target wildlife species. We further recommend that the legal regulation be extended to exclude the export of 1080 to Mexico, or any other foreign country, where the danger of misuse is substantial.

#### SUMMARY

Federal responsibility for minimizing animal damage is properly assigned to the Fish and Wildlife Service. But the program of animal control, under the Branch of Predator and Rodent Control, has become an end in itself and no longer is a balanced component of an overall scheme of wildlife husbandry and management. In the opinion of this Board, far more animals are being killed than would be required for effective protection of livestock, agricultural crops, wildland resources, and human health. This unnecessary destruction is further augmented by state, county, and individual endeavor. The federal government, it would seem, should be setting an example in the proper scientific management of all wildlife resources, with a view to total public interest and welfare. Instead, the Branch of Predator and Rodent Control has developed into a semi-autonomous bureaucracy whose function in many localities bears scant relationship to real need and less still to scientific management.

It is our recommendation that there be a complete reassessment of the goals, policies, and field operations of the Branch of Predator and Rodent Control with a view to limiting the killing program strictly to cases of proven need, as determined by rigidly prescribed criteria. Where control must be undertaken, as for example of coyotes on important sheep ranges, the operation should be pre-

P&RC

- 28 -

3/9/64

cisely accomplished, under close supervision, with minimum danger to non-target species. Some of the funds saved in this belt-tightening process could well be devoted to research on better and more precise methods of alleviating damage. An Advisory Board on Predator and Rodent Control, appointed by the Secretary of the Interior, is suggested as one mechanism for assuring consideration of total public interest in this program.