The Predator-Control Scene as of 1974

FREDERIC H. WAGNER

Highlight: *Mounting public pressures against predator control, especially with toxicants, plus the information compiled by the Cain Committee led to the Executive Order banning the use of toxicants on federal land and by federal control agents. Reaction of the livestock industry has been to ask that control be moved into the state governments and to seek release of M-44 cyanide guns through an experiment clause in the Environmental Protection Agency order withdrawing toxicant registration. An accelerated research program under the aegis of a number of agencies is providing a great deal of information, but needed programs are falling between the cracks because of the lack of integrated analysis and attack on the overall predator problem. A multidisciplinary, federal predator commission is proposed which would have responsibility for analyzing the problem in concert, providing critical advice on proposed programs and available information, communicating with all interested parties, and advocating policy.*

I have been asked to write a "philosophical" article on the predator-control situation as of 1974. I propose to do this by giving a brief, retrospective summary of the events leading up to the Executive ban against the use of toxicants in February, 1972, some consideration of the sequence of events which followed the ban, a closer look at the scene as I interpret it today, and a suggestion for one course of action that might be helpful. Perhaps the fact that I am somewhat suspect to conservationists and sheepmen alike attests to my objectivity for doing this task.

The Situation Prior to the Executive Order

Prior to February, 1972, the predator-control situation in the West was in an uneasy equilibrium. No one was satisfied with it. Stockmen were sustaining losses–more than they thought reasonable–and were not sanguine about the job being done by the Division of Wildlife Services (DWS). Conservation groups were restive about the widespread use of toxicants and possible hazards to the biota. DWS was caught squarely in the middle, attempting to compromise between opposing demands, operating in areas where solid, factual information was wanting, and pleasing no one.

My own opinion is that the Division was doing a better job than most of its critics gave it credit for. It had installed a professionally trained, wildlife biologist as its director in the 1960's, had developed a set of uniform, nationwide operational guidelines, and had kept a surprisingly good series of records on its operations. There were, of course, violations. It did have a control mind-set bred of the fact that its field men had traditionally been hired to catch and kill predators. But one could see changes in philosophy as new men were employed and in response to rising pressures from fast-growing, environmentally concerned facets of society. Violations were disciplined. With its administration located in Washington it was to some degree buffered from the grass-roots political pressures to which its field men in the West were subjected. And predator control was largely in the hands of public servants whose activities were under the

The author is associate dean, College of Natural Resources, Utah State University, Logan.

control of agency administrators, and whose practices, and to some degree, effects were recorded and accountable.

But the balance of forces was changing. The rise of environmental awareness, and the public awakening to the wonders of, and its ownership in, our natural resources focused increasing pressures on predator control. The equilibrium was destined to shift.

The Cain Committee was appointed in early 1971. Five wildlife ecologists, one plant ecologist (and former Assistant Secretary of the Interior), and one political scientist were given a few short months to evaluate a set of complex ecological and economic questions on which there had been little research, and to make recommendations for change.

One of the most significant questions which the Committee deliberated was the effectiveness of toxicants. I reviewed most of the evidence available to us at that time on pages 36-58 of the report (Cain et al., 1972) and elsewhere (Wagner, 1972). That evidence, all originally recorded incidentally to the question at hand, came almost entirely from DWS records and the statistics of U.S. Department of Agriculture's Statistical Reporting Service (SRS). There were few data from research carefully designed to shed light on the effectiveness of toxicants in reducing coyote populations and sheep losses, and the side effects in the environment.

The information that we were able to compile was equivocal. The indications, in my view, did point rather strongly to coyote population reductions that were proportionate to the amount of 1080 used (Cain et al., 1972:42-44; Wagner, 1972:21-25). With the coyote population indices available, reductions seemed rather strongly indicated in such northern Intermountain states as Montana, Wyoming, and Idaho; but undetectable in such southern states as Texas, New Mexico, and perhaps Arizona.

Any justification for predator population reduction must lie in its reduction of sheep losses, and evidence on that point was conflicting in late 1971. Available indices based on DWS records suggested reduction in sheep losses during the era of toxicant use; but indices based on the more extensive, and statistically designed, Statistical Reporting Service surveys suggested no reduction in post-docking losses during the toxicant era (Cain et al., 1972:47-53; Wagner, 1972:32-37).

Evidence of side effects on nontarget species was also inconclusive. There is no question that individual carnivorous animals other than coyotes have been killed by toxicants. But it has not been established that the population levels of these species have been detrimentally affected. In fact, a number of the common, mammalian carnivorous species may actually have increased following toxicant-induced coyote reduction (Robinson, 1961; Linhart and Robinson, 1972; Cain et al., 1972:55-56; Wagner, 1972:38-41). We do not know about the effects on raptor numbers, on the larger carnivores, and on smaller, rare-and-endangered species.

Public pressures were sufficient that some change in poisoning practices virtually had to take place. If it were true that coyote poisoning did not materially reduce sheep losses, as the SRS data suggested, there was then no reason to continue it. Yet these data were of unknown accuracy, and contradicted by the DWS records. In my view precipitate change was not indicated, and I advocated experimental reduction in trial areas to observe the effects, along with some form of insurance or some other compensation for losses (Cain et al., 1972:62; Wagner, 1972:55-56). Other members of the Committee saw the evidence, and assessed the public restiveness, differently than I and recommended immediate cessation of toxicant use in the Committee Report. That report was duly filed in fall 1971.

Developments since the Executive Order

For reasons given above, and others to be outlined below, I felt that the February, 1972, Executive Order banning toxicant use was somewhat abrupt. I favored a phased, experimental withdrawal. But more than one official in the Executive Branch has told me that government does not move in such rational, orderly fashion. The system needs to be jolted before it responds. In effect, the political mule needs to be hit over the head with a 2-by-4 in order to get its attention.

There must be something to this view, because massive funding has become available for predator research. To its very definite credit, the Department of the Interior reprogrammed funds internally to free support for an expanded predator research program. And several bills appropriated additional research funds for the Department of the Interior, Agricultural Research Service, Economic Research Service, Environmental Protection Agency, and other federal agencies. At the same time, a number of states made funds available. A welter of predator projects have sprung up during the 2 years following the ban.

But a number of results feared by many observers have developed, or are in the process of developing. The stockmen understandably felt they were treated unfairly, if not betrayed. They have been quoted in the media as saying that Secretary Morton promised them that they would be shown the Cain Report before its release, and they were not. Whether or not they received such a promise, they clearly were not represented on the Committee, were not invited to participate in the deliberations leading up to the recommendations of the Committee (although some did testify under invitation before the Committee meetings in Denver and Logan). And they were not apprised of the Committee's recommendations, or rationale for those recommendations, prior to release of the report.

If there is one lesson that comes through strongly in the tortured history of predator control–and all resource management, for that matter–it is that the day of single-value management is gone. Predatory animals are game species to the growing clan of varmint hunters. To hikers, campers, back-packers, and numerous groups of nature lovers, they are as much a part of the variety and beauty of the American outdoors as pine trees, lakes, red squirrels, and deer.

Hindsight vision is, of course, always 20:20. But in retrospect it would seem proper to have brought stockmen into the deliberations which affected them so profoundly. That they were not brought in has placed them in a near-martyr posture, and this in turn contributes to some of the current developments, two of which merit emphasis here.

The Move to the States

One of the early actions taken by Western stockmen, or their representatives in the various state departments of agriculture, after the Executive Order was to press the Department of the Interior to turn predator control over to the states. The rationale was obvious. The stockmen recognized very well that the growing pressures against

predator control were substantially generated by Easterners who, they felt, did not understand and/or did not sympathize with their problems. As long as control was in the hands of the federal government, this large voting block could exert pressures against control. If toxicants were banned today, shooting, denning, and trapping–the only remaining control measures–might go tomorrow. If control were in state hands, it would be separated from Eastern political pressures, and closer to home where people were more sympathetic with the plight of the livestock industry and perhaps less environmentally concerned.

The states have not needed to beckon very hard because they have been finding a more-than-willing Department of the Interior. Explicitly, the Department is moving to turn control over to the states because predators are resident wildlife. But implicitly, the Department is probably anxious to get the predator-control monkey off its back.

In principle, the move to the states is quite proper. By tradition and statute in the United States, ownership and responsibility for management of wildlife resident within the states have been vested in the people of the states and their state governments, even when that wildlife resides on federal land. That Western predator control should have been in the hands of a federal agency all of these years is largely a matter of tradition dating back to the World War I years and the existence of large acreages of federal land in the West.

In practice, however, many observers fear the direction the stateward move is taking. The stockmen are asking that control be taken over by the state departments of agriculture. Their reasoning, quite understandably, is that these departments have the same value systems as they, and would carry out predator control with the singleness of purpose which they desire.

Since the impression has spread that the industry was not treated with sufficient consideration and respect in the course of the Cain Committee study and subsequent Executive Order, it has incurred the sympathies of the Western-state executive branches. There is, accordingly, rather strong inclination among many of these branches to place control in the state agriculture departments. Such a move has already been made in Colorado. And a bill now in the hopper in the Utah legislature proposes that predator control be placed in the hands of a new commission, most of whose members are either industry representatives or employees of agriculture-related agencies.

Many observers are voicing concern that these moves violate the spirit, if not the letter, of the traditional American legalities surrounding wildlife resources. By statute, wildlife is the property of all the people, and therefore should properly be managed by agencies which are responsive to a plurality of values of all the people.

If there is one lesson that comes through strongly in the tortured history of predator control–and all resource management, for that matter–it is that the day of single-value management is gone. Predatory animals are game species to the growing clan of varmint hunters. To hikers, campers, back-packers, and numerous groups of nature lovers, they are as much a part of the variety and beauty of the American outdoors as pine trees, lakes, red squirrels, and deer.

Traditionally, the responsibility for wildlife management has been vested in the hands of the divisions or departments of fish and game, or wildlife resources. Livestock predatory loss is but one of numerous kinds of wildlife damage. There are innumerable precedents in which the state wildlife departments have assumed the responsibility for controlling such damage. In most states, these agencies remove the offending animals when deer or elk raid orchards or alfalfa fields; when beaver drop trees on dwellings or flood roads; when pheasants pull newly sprouted corn or raid tomato fields.

It remains to be seen how the move to the states will settle out. The final result will probably vary from state to state.

The M-44 Experiments

Following issuance of the Executive Order, the Environmental Protection Agency suspended and cancelled all registrations of cyanide, strychnine, and sodium monofluoroacetate (1080) for predator-control purposes. However, the Pesticide Act contained a proviso which stated that these substances could be released under special cases for experimental purposes.

As concerns grew among stockmen that the toxicant ban would promote coyote population increases, pressures were brought to bear on the Environmental Protection Agency to develop "experiments" in toxicant use. To date there has been no predisposition to release 1080, but the door has been opened to the experimental release of the M-44 cyanide gun, the newer, spring-ejected version of the old cartridge-ejected "coyote getter." The first state for which such an experiment was designed was Texas. Montana followed suit next, and a number of Western states have expressed interest in participating.

I am personally in favor of such experiments properly designed and carried out. We need to evaluate the effectiveness of specific control measures, including toxicants, and I see no way of doing so except to set up carefully controlled experiments, one by one, with each control measure to be evaluated. The M-44 is probably the most specific coyote-control technique available except for denning and shooting. Its effectiveness needs to be assessed.

But one cannot help but be concerned about two aspects of the move toward M-44 "experiments" in the Western states. One is the evident, widespread assumption among individuals of the livestock industry that M-44 use will reduce their losses. This, like the bounty matter, is another manifestation of the wide communications gap which exists between stockmen, wildlife biologists, predator-control agents, and individuals in government. It is my contention that this gap underlies much of the chaotic situation in which the predator-control question now exists.

Although the evidence is far from conclusive, and solid research is needed to get at the truth, the currently available information raises some real questions about the effectiveness of cyanide guns. Older predator-control agents frequently recount the response of coyotes to "getters" in the 1950's after they appeared. At first, they appeared quite effective and large numbers of coyotes were killed. But after a few years, the response dropped off markedly, perhaps because a learning process set in among the animals and/or because the genetically getter-prone animals were culled out of the populations.

Whatever the mechanism of change, there is reason to doubt the effectiveness of widespread M-44 use as a coyote-control measure. Plunging headlong into such use could be wasteful of funds. This message seems not to have gotten out to the world.

A second cause for concern in the move toward the M-44 experiments is the manner in which some of the "experiments" to date have been designed. In one case, M-44's were to be given to stockmen to set out after brief instruction on setting them. Evaluation was to be based on tallies by the stockmen of the animals killed. These tallies were then to be reported to county agents who were to compile and report the results. A number of worthwhile, subsidiary objectives were set forth, but in most cases it was not specified who would pursue them, nor by what procedures.

It is a matter of record that some degree of credibility gap exists between livestock people and conservation groups. Predator-control evaluations need to be made by trained researchers who are practiced in the careful, objective observations used in science, and who enjoy a measure of trust among people on both sides of the question. The danger in experiments like the one described above is that at best the results will not be accepted by non-livestock interests. At worst the results could be inconclusive or incorrect because the experiments were improperly designed, or the data taken carelessly or unobjectively.

The potential problems in the move to the states and the M-44 experiments are but two of a number of event chains which add up to near chaos on the current predator-control scene. But before considering what I believe could be one, at least partial, remedy I would like to review briefly what appears to me to be known about coyote control and sheep losses, and where the important knowledge gaps are.

We are gaining an increasingly sound picture of the magnitude of sheep losses, the dauses of those losses, and the circumstances under which they occur. The practical spin-off for reducing loss and applying control should be substantial.

Some Knowns and Unknowns on Coyote Control and Sheep Losses

Coyote Populations

We know very well that coyote populations undergo short-term (i.e., 7-10 years) fluctuations or cycles in numbers as do other animal populations. These fluctuations can be quite pronounced, the highs exceeding the lows by a factor of 10 or more. They occur independent of predator-control operations and appear, at least on the basis of Kansas and Utah studies (cf. Gier, 1968; Clark, 1972), to result from rises and falls in the prey populations.

The effect of generalized predator control (i.e., control aimed at reducing populations) apparently is to set the general level at which these fluctuations occur, (cf. Wagner, 1972). Hence the effects of control, or absence thereof, cannot be judged by the trends in coyote populations over 1 or 2 years. Densities of a number of years are needed to demonstrate control effects.

This point is stressed here because stockmen were reporting increases in coyote populations immediately following the Executive ban, and assuming cause and effect. In some cases increases did occur, as in fall 1972 in the vicinity of my own study area in northwestern Utah and southern Idaho. But this coincided with a jackrabbit high in 1970 and 1971. The decline of rabbits in 1972-74 was followed by coyote declines in 1973 and 1974 when no toxicants were used.

Coyote population changes are more complex than simple responses to the intensity of control. The excellent population index network established throughout western United States in 1972 by the Denver Research Laboratory of the Bureau of Sport Fisheries and Wildlife (BSFW) will go far toward providing sound information on coyote population phenomena. These surveys are already providing quantitative information on coyote distribution. One of the interesting pictures emerging is the north-south gradient in coyote densities. Coyote populations in Texas, New Mexico, and Arizona may be two to four times as high as those in Montana and Wyoming. Unfortunately, the findings of these surveys, which could dispel some of the misinformation which appears periodically, have not been publicized or reached public notice.

Some of the best predator research now underway is that being conducted by BSFW. Coyote ecology and behavior are being studied in detail to learn the role of behavior in population regulation, the behavior patterns used during predatory attack, the role of the prey base in population mechanisms, daily and seasonal movement patterns, and population mechanisms in uncontrolled populations. These studies should soon provide a thorough understanding of the ecology and behavior of the species, and go far to enhance our knowledge of the circumstances under which sheep killing takes place. Much of this could be applied in control measures or modifications of sheep-rearing practices to reduce losses.

Effects of Control on Coyote Populations

The coyote is a prolific species, the females becoming capable of breeding in their first year of life and litter sizes averaging around six. Potentially the species could quadruple its numbers each year.

That breeding occurs annually, and that coyote populations do not increase indefinitely must imply that mortality is high. In fact over the long run, it must be true that as many coyotes die as are born. This is the same scheme nature has built into all of her animal species.

It follows that the killing of some coyotes does not necessarily affect their population density. The deaths so induced might simply replace mortality that would have occurred by other means. Control mortality must be raised to a sufficiently high level that it offsets the high breeding rate before a population is reduced. That level of mortality is often difficult to attain because, as a population starts to be trimmed down, the survivors become scarce and more wary. One of the major, unanswered research questions is the level of control mortality needed to reduce coyote densities.

Timing of control operations may be important. Knowlton (1972) suggests that control might be more effective in late winter and early spring just prior to breeding than in summer or fall.

These facts underlie the failure of bounties. Bounties tend to be paid to hunters who shoot coyotes while hunting other game, to trappers out for pelts, and to varmint hunters out for sport. All of these groups will tend to quit killing coyotes when numbers drop to some degree, and the survivors become wary. But the reduction that is achieved may be well short of that needed to reduce populations. At the same time, some

individuals would kill coyotes if there were no bounty.

We have very little evidence that gives us any indication of the effects of different control methods. As mentioned heretofore, I have compiled some information which points to population reduction by toxicants, especially 1080. The effect has been most pronounced in northern states, and least effective, if at all, in southern states. But for the most part, this topic is one of the ones receiving almost no research attention. It is falling between the cracks because, as outlined below, there is no overall, coordinated analysis of the predator problem and systematic attention to all its facets.

Research needs to be conducted on all methods of control. Toxicants need to be experimented with under carefully controlled conditions as well as mechanical control methods. A poison-impregnated collar to go around sheep necks, and developed by BSFW personnel prior to the ban, is perhaps the most promising hope for destroying the offending individuals. Research on this item has been slow to develop.

Magnitude of Sheep Losses

As Balser (1974) points out, sheep loss estimates are few, often stated in confusing ways, and of unknown validity. He and Wagner (1972) suggest that losses of sheep to all causes may range around 10-12% per year. Ewe losses, according to Balser, may average around 7% and lamb losses around 11. These estimates are largely post-docking losses, with accurate estimates of losses between birth and docking hard to determine.

Within these 10-12% total losses, there is some indication that predators account for an increasing fraction of the total as one goes from north to south, and weather losses display the converse pattern (Wagner and Pattison, 1973). We now have a number of estimates of predator losses which are consistently falling in the range of about 1 to 5%. These estimates come from intensive, on-the-spot observations by researchers (cf. Davenport et al., 1973, 1973a for southern Utah; R. Nass as quoted by Balser, 1974 for southern Idaho); personal interview of stockmen (Nielson and Curle, 1970, in Utah); and mail poll of stockmen (Reynolds and Gustad, 1971, for Montana, Wyoming, Colorado, and Texas). As Balser (1974) points out, all of these loss estimates pertain to a period during which predator control has been practiced. We do not know what they would be in the absence of control.

Two characteristics of the losses appear to affect the stockmen's perception of the losses. The first is that the statistical distribution of the losses appears to approximate the Poisson distribution, with a large fraction of the operators sustaining low percentage losses, and a small percentage sustaining a high percentage (Wagner, 1972; Balser, 1974).

The second characteristic is that all observers, including stockmen, actually see a relatively small fraction of the lost animals. Even under the intensive observations of research projects, Davenport et al. (1973a) were able to find only a third of the lost animals in their southern Utah study. This is a pattern reported for other similar projects by Balser (1974).

Whatever the mechanism of change, there is reason to doubt the effectiveness of widespread M-44 use as a coyote-control measure. Plunging headlong into such use could be wasteful of funds. This message seems not ot have got out to the world.

One interesting set of figures from the southern Utah study (John Davenport, unpub.) relates to the number of sheep killed per predatory incident. In 108 observed incidents, 309 sheep were killed: 42 with one animal killed, 58 with two, 14 with three, 8 with four, 5 with five, 2 with six, and 7 with more than six. In one of the latter, 20 were killed. If a large proportion of these were the actions of single coyotes, the implication is that the total loss could have been reduced by perhaps as much as a half or more if the offending animal had been killed or repelled after the first sheep attack.

Loss estimates, and research into the husbandry and ecological conditions under which losses occur, are underway in a number of areas at present (Balser, 1974). This, again, is one of the areas in which effective BSFW research is being conducted. We are gaining an increasingly sound picture of the magnitude of sheep losses, the causes of those losses, and the circumstances under which they occur. The practical spin-off for reducing loss and applying control should be substantial.

Effectiveness of Control in Reducing Sheep Losses

Basically, predator control has been carried on over the past 3 decades or more under two general objectives or purposes. The first is that of trouble shooting problem cases. Where a rancher has a lambing ground or a flock in an area where one or more coyotes begin systematic killing, he may call the local DWS agent to come in and stop the losses. The agent may set traps or getters, fly over and attempt to find and destroy the offending animals from the air, or locate and destroy a nearby den which is the source of the trouble.

To my knowledge, there are no data to evaluate the number of sheep saved by this aspect of control. Almost certainly some animals are saved which would be lost if the offending coyote(s) were allowed to continue unchecked. DWS administrators have told me that they attempt, as a goal, to reach the great majority of these complaints: e.g., three-fourths or more.

Perhaps the mean number of sheep saved per incident could be determined by comparing the losses in those cases where the offending coyote is apprehended, and in those where the offender is not caught. Then perhaps the number of ranchers asking for help could be determined and in this way some estimate derived of the total number of sheep saved through trouble-shooting control.

The second, general approach to control has been through generalized, regional population reduction. Prior to the late 1940's, when some of the toxicants came into general use, large numbers of traps were set over the countryside. In the past 2 decades, and prior to the Executive ban, 1080, "getters," and strychnine were disseminated over the landscape in an effort to effect generalized population reduction. Aerial hunting in winter and extensive denning in spring may also be practiced for this purpose.

In some cases trouble-shooting control and population-reduction techniques may merge in an intermediate effort. For example, aerial gunning, denning, and dissemination of some kinds of toxicants may be concentrated in an area where lambing is soon to take place, or into which a flock is soon to be moved.

The basic assumption underlying population reduction is that some correlation exists between coyote density and sheep

losses. As mentioned above, I concluded in the Cain Committee Report and in Wagner (1972) that the existing evidence did not point to such a correlation. Since that time, I have reanalyzed some of the data available to me then, examined new information, and tentatively concluded that such a correlation does exist (Wagner, 1973; Wagner and Pattison, 1973). Since the evidence suggests that control efforts, primarily toxicants, have reduced coyote numbers in the northern Intermountain states, it now appears possible that sheep losses will rise in this region following the ban.

This is no certainty, however. As stated heretofore, the size of the prey base is an important determinant of the coyote population level. The conclusion that coyote numbers were reduced by the introduction of toxicants was based on evidence that the available indices of their numbers were lower during the 1950's and 1960's than prior to 1950. If, during this latter period, intensification of land use has reduced prey numbers, coyote populations might not be able to return to the pre-1950 levels. Only time will tell on this question.

Meanwhile, there is some evidence of gradual increase in sheep losses between 1950 and the Executive ban during a time when coyote populations apparently were roughly stable (Wagner and Pattison, 1973). Causes are unknown.

This subject is another one which is not receiving sufficient research attention due to a lack of concerted planning. The degree to which different control regimes do or do not reduce sheep losses needs careful analysis.

Economic Aspect of Losses

With the estimates of predator losses we now have available, we could estimate the economic value of those losses. This in itself would be of interest. But in terms of cost-benefit analyses, the more relevant estimates would probably be to compare predator-control costs with the value of sheep that would be lost without the presence of control. This latter figure cannot be confidently estimated with data now at hand. However, some speculative figures might be of interest as leads for future research.

On the basis of DWS records from Utah, I conjectured previously (cf. Cain et al., 1973:49; Wagner, 1972:33) that abolishing toxicant use could conceivably result in a two-fold increase in predator losses. Other DWS data also suggested that toxicant use might have effected a 50% or more reduction in coyote numbers in northern Intermountain states. If the populations do return to their pre-toxicant levels, these figures also could suggest something approaching a doubling of predator losses in this region.

The studies cited above largely place predator losses at about 2-4%. Hence, if—and this is a big if—the losses double, we could conceivably see them rise by this amount.

Estimates of the industry's profit margin depend on whether or not the land values, buildings, fences, and other semipermanent facilities are capitalized into the costs. If they are not, then the cost estimates are based on year-to-year operating expenses and the rationale for not capitalizing is that the facilities were perhaps inherited from prior generations. Under this rationale, the profit margin is, of course, higher and on the average substantial. If the facilities are capitalized into the costs, those costs rise substantially. Using the latter approach, Goodsell and Belfield (1973) reported a rate of return on investment of 4.2% for sheep ranches in Utah and Nevada.

The implication now is that *if* predator losses do rise even by the minor amounts discussed above, they *could* conceivably offset the present, narrow profit margin. It should be pointed out that the industry's problems are not predators alone. It is beset with a cost-price squeeze of multiple origin, not the least of which is its manpower problem. If the industry were strong, it could live with moderate predator losses. But with the economic realities it does face, it is conceivable that a slight, added predator loss could be the straw that breaks the camel's back.

I wish to emphasize that these remarks are highly speculative. They may be incorrect. And the currently available figures suggest these trends only for the northern states. But I present them here because I think we need to consider them as a possibility. They point up the urgent need for sound, economic analyses of the industry and of the benefits from predator control of different kinds and intensities.

One Possible Contribution to the Problem

The predator-control problem is biologically, agriculturally, and economically complex. Developing a sufficiently thorough understanding of it so that knowledgeable judgments can be made and policy can be set requires soundly conceived research and experienced appraisal of the available information. The problem is also socially complex in that several facets of society are concerned about it, some of whom are in conflict over the matter.

Because the problem is multifaceted, research planning and policy formulation should take place in an integrated manner wherein: (1) appropriate expert judgment is brought to bear on proposed programs and available information, (2) the values and desires of all concerned interests can be expressed and accommodated, and (3) available, sound information is communicated promptly to all interested parties.

At present, the exact opposite of this pattern prevails. Rather than integration, we have the separate interests competing, pulling in opposite directions, and not communicating. The interested facets of society give limited, if any, consideration to each other's values and desires. Because government is compartmentalized, its agencies tend to side with the different facets of society, plan research and operations internally, and in some cases compete and duplicate. And in many cases what sound information we do have is not adequately communicated while at the same time misinformation is widely publicized.

In consequence, programs are being designed which do not get the appropriate critical input from available experts. Well-intentioned funds from both legislative and executive branches of government are made available for crash, 1-year studies to solve problems that cannot be solved in less than several years. Needed programs are not being developed because the problem is not being handled in a systematic and coordinated, interdisciplinary manner. Increases in coyote populations are being reported in the media when in fact the reliable population indices we have in the same areas indicate sharp declines.

What is needed, in my opinion, to alleviate this situation, is to bring representatives of the interested factions together into some integrated approach to the problem. The vehicle for accomplishing this should probably be a commission appointed by, and responsive to, some branch of the federal government (probably executive) with considerable authority. Its responsibilities should be several:

(1) Study and analysis. It should have the prerogative of calling on the resources of appropriate agencies to provide it with needed information. It should analyze the overall problem in perspective and identify research and policy needs.

(2) Review and advisory. It should review research and operational programs proposed by executive agencies and have the confidence that its recommendations on these would be accepted. It should also provide an advisory function for legislative proposals. It should recommend to the executive branch and/or Congress, as appropriate, certain programs which at present are falling between the cracks.

(3) It should advocate policy and operations on the basis of the information it obtains.

(4) It should provide a communications function, possibly through a newsletter or other medium, to the public media and to interested facets of society. Existing knowledge and the reasoning behind any policies and actions should be explained and interpreted.

Tenure of the organization should be indefinite. What we do not need is another 1-year committee to study the problem and file a report. And it need not be established if it is not related to government in such a way that it has sufficient influence to affect the course of events.

Membership in the group should be well balanced between the concerned citizen groups (livestock and agricultural, environmental, sportsmen) the relevant professional experts (biological, agricultural, and economic), and possibly legislative representatives. It should probably have a small permanent staff to handle correspondence and issue publicity material, but beyond this the budget should be modest with funds only to cover the expenses and perhaps modest honoraria for the members.

Whether or not such an organization could still pull the fast disintegrating predator scene back into some degree of order is not certain. But if some such move is not taken, the present trends will likely end up in an unsatisfactory state of affairs. I have confidence that human beings will act with reason when presented with the facts and treated with respect. If order is to be brought to the predator-control scene, some means need to be provided in which rational men can be brought together to seek the truth, to communicate with each other, and to affect the course of events in concert.

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