

UC Agriculture & Natural Resources

Proceedings of the Vertebrate Pest Conference

Title

Predator damage control: 1980 to 1986

Permalink

<https://escholarship.org/uc/item/4v76d9w7>

Journal

Proceedings of the Vertebrate Pest Conference, 12(12)

ISSN

0507-6773

Author

Wade, Dale A.

Publication Date

1986

PREDATOR DAMAGE CONTROL: 1980 to 1986

DALE A. WADE, Wildlife Specialist, Texas Agricultural Extension Service, San Angelo, Texas 76901.

ABSTRACT: This discussion is an update from Wade (1980) which summarized executive and other decisions relating to cancellation of the predacides in 1972. This review continues that summary of major events from January 1980 to the present. Major political factors, predator damage control, and research findings during this period are briefly discussed. A chronology of administrative and judicial decisions and related events is appended (Appendix A).

INTRODUCTION

The earlier review (Wade 1980) recorded the sequence and relationships of certain events related to the 1972 cancellation of toxic chemicals used for predator control in the United States. The actions which accomplished the cancellations were the Executive Order by President Nixon (Nixon 1972) and the cancellation/suspension order by the administrator of the Environmental Protection Agency (EPA; Ruckelshaus 1972). However, the primary causes of these actions were certain political concerns and personal interests of key Presidential advisors as documented by MacIntyre (1982) and others. The cancellations were followed by ADC policy revisions of which the most extensive was issued by Secretary of the Interior Cecil D. Andrus (Andrus 1979).

HISTORY 1980-86

The new policy on animal damage control (ADC) issued by Secretary Andrus, U.S. Department of Interior (USDI) in November 1979 included prohibition of coyote denning and all further research and development of Compound 1080, and additional restrictions on aerial hunting. The policy emphasized non-lethal, noncapture methods and livestock husbandry to control predation on livestock (Andrus 1979). The policy placed extensive emphasis on "protection of the environment." Numerous professional staff in the ADC program and the members of the Western Regional Coordinating Committee for Predator Research (WRCC-26) pointed to the lack of objectivity and professional competence in and the political nature of the policy statement (WRCC-26 1980). Andrus further clarified the political nature of his policy decisions in January 1980 (Andrus 1980).

Opposition to the "Andrus Policy" surfaced and expanded rapidly; bills were introduced in the U.S. Senate and House of Representatives to mandate changes in the policy, use of chemicals, etc. These actions led the Secretary to make various policy revisions, some by "interpretation," during the next several months. These revisions were hastened, perhaps, by public hearings on the issue of predation and its control which were held by the U.S. House of Representatives (USHR 1980) and the U.S. Senate (USS 1980) in April of 1980 during which the lack of factual and professional support for the contents of the "Andrus policy" became a matter of public record.

The progressive shift of USDI Fish and Wildlife Service (USFWS) ADC policy from earlier concerns for protection of livestock, crops, etc., to one primarily of wildlife preservation is evident in the USFWS "Service Management Plan" (SMP; USDI-FWS, June 1980) which delineates the USFWS "Mission" as follows (page 3):

The mission of the Fish and Wildlife Service is to "PROVIDE THE FEDERAL LEADERSHIP TO CONSERVE, PROTECT AND ENHANCE FISH AND WILDLIFE AND THEIR HABITATS FOR THE CONTINUING BENEFIT OF PEOPLE." (emphasis supplied by the USFWS).

The SMP also described the USFWS "Animal Damage Control Service Goal" as follows (page 4):

To assist in reducing wildlife-caused damages in a manner which takes into consideration impacts on the environment.

To further clarify USFWS policy, the SMP included an "IMPORTANT RESOURCE PROBLEM-PROGRAM RELATIONSHIP MATRIX" (page 22) in which the agency listed only the following ADC-related problems from a total of 78 "Important Resource Problems":

No. 6: Migratory Waterfowl-North Dakota, South Dakota, Minnesota

No. 67: Golden eagle-West Texas

However, these are not listed as "Primary Direct Responsibilities," but only as "Concurrent Responsibilities" in the SMP. Thus, it appears that by June of 1980 the USFWS had determined that it no longer had a significant responsibility to deal with the majority of animal damage problems caused by wildlife in the United States.

This "Mission and Goal" appears to have become recognized and accepted as predominant factors in USFWS management of the ADC program, despite its protestations to the contrary. The U.S. General

Accounting Office (GAO) issued a detailed report, "National Direction Required For Effective Management of America's Fish and Wildlife," in August 1981 (USGAO 1981) which was highly critical of the USDI attitude, policies, operation and support of the ADC program (pages 35-41). Further, the GAO report stated that:

"...the Service said our findings on the Animal Damage Control Program are essentially correct..."

The USGAO concerns were repeatedly echoed by the International Association of Fish and Wildlife Agencies (IAFWA). A letter to Secretary of Interior James Watt on November 6, 1981, from the IAFWA contained the following as a part of the position statement of the IAFWA Animal Damage Control Committee (Fullerton and Grieb 1981):

In addition to the attached report the committee feels obligated to address the current state of the animal damage control program and provide recommendations for immediate action which we feel you should be taking. We are sure you are aware that there is a strong belief held by the livestock industry and others receiving major benefits from the services of ADC, that the program is inadequate. This position is not new, but has been reinforced and strengthened over the years by the apparent failure, under the previous several administrations, of the U.S. Fish and Wildlife Service to provide the services expected by these groups. One of the major points of contention has been a severe curtailment and reduction in the use of toxicants and other previously utilized control methods. Another has been inadequate funding. The International Association has repeatedly taken the position that a full complement of control tools should be made available for use by qualified damage control specialists. Past recommendations and requests for better "service" have not been reflected to date in the Animal Damage Control program.

In 1983, the IAFWA Committee again commented to Secretary Watt as follows (Grieb 1983):

We are aware that within the next several weeks you will be reviewing various options relating to the Animal Damage Control Program. In the course of that review, we hope that you will once again consider recommendations submitted to you November 6, 1981 by the Animal Damage Control Ad Hoc Committee of the International Association of Fish and Wildlife Agencies. These recommendations were approved by the International Association, and still remain the position of this organization. Although some action was taken to implement several of the recommendations presented by the International, most of them have not been addressed. The result is that the same problems described over two years ago still remain.

A critical issue has been funding. Each year, Fish and Wildlife Service budget requests curtailment of funding in the ADC area. Each year appropriations have been increased which continue to patch the ADC effort together. As a result, representatives of domestic livestock organizations have continually recommended transfer of this activity from Interior to Agriculture. They indicate that the program would not only be accepted there, but funded as well.

The International Association strongly believes that this wildlife program belongs in the Fish and Wildlife Service. We have been successful in our support of this to the present time. However, it is difficult to continue this support in face of the Services continued desire to eliminate funding and change the program.

Mr. Secretary, I strongly urge that you carefully consider our recommendations and provide a program that will effectively meet the needs of the livestock industry while maintaining management control of this wildlife species.

The growing dissatisfaction among various agricultural groups and others with USFWS policies and operation of the ADC program led to several attempts over the past three decades to effect a return of the entire ADC function to the U.S. Department of Agriculture (USDA) where the program had been until the USDI assumed authority in 1939. Several major agricultural groups and others had publicly requested without success the return (transfer) of the program by legislative or executive action. Despite the IAFWA support of the USFWS as the agency which should conduct the ADC program, there appears to have been a consistent and uniform failure by the USFWS to address ADC problems to the satisfaction of agricultural groups and to the interests of the wildlife management agencies represented by the IAFWA (Berryman 1985).

As a consequence of this apparent failure and possibly other factors, a concerted effort to accomplish return of the ADC program to the USDA began in the early 1980s. This effort, strongly supported by various U.S. Congressmen and Senators, was opposed by the IAFWA and various other groups despite comments by the IAFWA that there were valid reasons for dissatisfaction with the USFWS conduct of the program. The IAFWA position in regard to the proposal to return the program to the USDA was described, in part, as follows (Berryman: 1985; letter to the Secretary of the USDI):

This proposal is fueled by Interior's consistent failure to provide a responsible and acceptable level of control--even to demonstrate the interest and determination to do so. In our judgment, those responsible for the present proposal have a genuine grievance which will not be satisfied by wildlife management philosophy--only by a demonstration of good faith and an acceptance of the responsibility for providing relief. Our position that the responsibility should remain with Interior is conditioned by the parallel recognition of the need for Interior to more responsibly carry out this portion of its activities.

We recommend that Interior be allowed to retain the function at least for a two-year period during which it could demonstrate its willingness and ability to carry out the responsibility for animal damage control.

You may depend on our support for such a decision and for a more responsible program of animal damage control.

However, several agricultural groups and others, including U.S. Congressmen and Senators, professional ADC staff and other wildlife managers did not agree with the IAFWA. They indicated that there had been numerous efforts from 1960 to 1985 to persuade the USDI to follow its congressional mandate for damage control, as provided by the Animal Damage Control Act of 1931, without success. They also cited annual USDI efforts to delete fundings and positions for the ADC program, to transfer the program to individual states and/or to abolish the program entirely, as briefly discussed by Fullerton and Grieb (1981), Grieb (1983) and Berryman (1985). As a consequence, congressional support increased and, despite opposition to transfer/return of the program to USDA, in December 1985 the U.S. Congress agreed upon and passed an amendment to the 1986 continuing federal budget resolution which transferred all ADC personnel, equipment and funding from the USFWS to the USDA Animal and Plant Health Inspection Service (APHIS). The transfer became final with signing of the amendment by President Reagan on December 19, 1985. Actual transfer of the ADC administrative functions began in January and is expected to be complete by April 1986.

PREDATOR DAMAGE RESEARCH

Because of high costs and other factors, relatively little research on the effects of predation on livestock has been done since 1980. In general, however, the studies which have been done lend weight to earlier reports on livestock losses.

Wade and Connolly (1980) provided preliminary data on costs for 1 year of predation and other effects on an Angora goat ranch in Texas. Scrivner et al. (1985a), with data from two additional production years on the same ranch, found that predation-caused losses were reduced by more effective predator control from 1979 to 1981 as follows:

1979	1980	1981
\$49,340	\$6,670	\$12,030

They also found that indirect costs of predation were a major element in reduced income. Detailed analyses of enterprise costs and returns on Angora goat operations by Scrivner and Conner (1984) indicated that predation increased operational costs by 16.4%, 17.7% and 32.8% respectively, for wether, nanny/wether and nanny goat operations. Scrivner (1985) also found that predation losses were the production-limiting factor of greatest concern to both past and present Angora goat producers in three Texas counties.

Howard and Booth (1981) summarized data from their study of sheep mortality in New Mexico as follows:

Ewe and lamb loss estimates obtained by interviews with southeastern New Mexico sheep ranchers were analyzed for the 1975 and 1976 production cycles. The ranchers were the remainder of a sample of 100 first interviewed in 1972. Fifteen ranchers went out of sheep production after the initial (1972) phase of this study; 10 others dropped out of the survey.

Total ewe losses averaged 4.9% in 1975 and 6.0% in 1976, with predator losses averaging 1.5% and 1.0% respectively. Differences in the losses between 1975 and 1976 were not significant. Predation, mostly from coyotes, accounted for about one-fifth of total ewe losses each year.

Average total post-marking lamb losses increased from 8.1% in 1975 to 11.2% in 1976, with losses due to predation increasing from 5.2% to 7.4%. Both of these loss increases were highly significant ($P < .005$). Coyote and bobcat depredations were significantly greater in 1976 ($P < .05$).

Estimates of pre-marking losses were provided by only a few ranchers. Pre-marking losses on these ranches comprised 61% and 46% of 1975 and 1976 losses, respectively, and most were attributed to eagles.

Predator losses tended to be additive to other causes of mortality; there was no evidence of compensatory non-predator mortality whenever predation declined. Small ranches tended to suffer higher percentages of predator losses to both coyotes and bobcats in both years ($P < .05$). Predator losses did not vary significantly with respect to either lambing period or ranch size.

Schaefer et al. (1981) gave the following summary of predation on sheep in Iowa:

A questionnaire survey, field necropsies, domestic-animal claims, and a postcard survey were used to assess coyote and dog predation on sheep in southern Iowa. Forty-one percent of 1,251 questionnaire respondents reported they had sheep killed by dogs or coyotes (*Canis latrans*) during 1975. Of the total losses reported, 41% were attributed to predation, 30% to disease, and 13% to unknown causes. Three percent of all sheep owned by the questionnaire respondents allegedly were killed by coyotes, and 1% were killed by dogs. Both field necropsies and domestic animal claims showed that dogs killed more sheep per incident and sheep per operator than did coyotes. Almost 60% of the

postcard respondents attributed sheep losses to predation during 1976 and 1977. Coyote predation varied during summer and fall, with 80% of the incidents occurring from 1 May to 1 October; dog predation did not follow a distinct chronological pattern. Field necropsies of 227 alleged predator-caused sheep losses revealed that sheep producers correctly assessed the cause more than 94% of the time. The results of the questionnaire and postcard surveys were similar. Domestic-animal claims underestimated the actual number of losses that occurred.

O'Gara et al. (1983) provided a review of data from their study of predation on the Cook Ranch in Montana with the following conclusions and summary:

Conclusions

Livestock lost to predators during the 30 months of our study was worth over \$50,000, not counting secondary losses. Without predator control, losses may have been higher. Excessive coyote predation is often thought to be a manifestation of poor management or over-grazing, as represented by Allen (1962), "Range depletion-> disease-> predation." The Eight Mile Ranch management program, including shed lambing was excellent and the range was lightly grazed. However, the high rate of predation would not have been documented except for the reimbursement agreement which kept the owner from selling his sheep in 1974. Many catastrophic predation situations may have gone unreported for economic reasons. The average loss statistic is probably depressed as operators with high predation losses withdraw from sheep ranching.

Summary

Mortality suffered by domestic sheep was studied on the Eight Mile Ranch in western Montana from 15 March 1974 through 30 September 1976. Shed lambing; open pastures and intensive searches allowed us to keep losses to unknown causes to <1% of the herds each year. Adult ewes suffered 3.2-5.3% nonpredator deaths and lambs suffered 7.5-11.1%. During the same time period, predators killed from 1.5 to 8.4% of the ewes and from 12.5 to 26.8% of the annual lamb crops. Coyotes were responsible for 97.6% of all predation. Kills per day were highest during early May to early June. Leaving carcasses in pastures had no discernible effect on the number of new kills. Coyotes appeared to attack sheep as they were encountered, regardless of their health. Of the 1,223 sheep killed by coyotes, 73.6% were killed by neck-throat wounds. Coyotes wounded, did not feed on, or ate <25% of over half of the sheep they killed. Coyotes were sighted chasing, feeding upon or within 100 m of sheep 131 times, but only 2 kills were observed from attack to death. This study showed higher losses to predation than any we found in the literature, but it came closer to having no control than the others, and it had fewer deaths to unknown causes.

Scrivner et al. (1985b) reported on sheep losses to predators during 11 years at the University of California Hopland Field Station as follows:

Predation at the University of California Hopland Field Station was evaluated for an 11-year period beginning in 1973. Of those lambs placed on range, an average of 2.7% were killed each year by predators. An average of 1.5% of the ewes were killed. When the number of missing animals which were killed was estimated, the average annual predation rate for lambs and ewes killed was 10.4 and 3.8% respectively. For all known ewe and lamb deaths, respectively, 45% and 26% were caused by predators, 14% and 28% died from causes other than predation, and 41% and 46% died from unknown causes. Of those sheep killed by predators, 89% were killed by coyotes (*Canis latrans*), 8% dogs, and 1% each by black bear (*Ursus americanus*), mountain lion (*Felis concolor*), and golden eagle (*Aquila chrysaetos*). More sheep were killed by coyotes from October to March than from April to September and the annual number of sheep killed by coyotes and dogs has increased since the beginning of the study. Not including the value of missing animals which were killed, the present value of livestock killed by predators was estimated to be \$62,364.

The results of these studies tend to support earlier estimates and reports of predation losses, including the summary by Wade (1982) which indicated that:

Losses to predation in the 17 western states in 1977 were 4 to 8% of the lambs, 1.5 to 2.5% of the ewes and 0.4% of the calves according to estimates from surveys and studies of predation. On the basis of these loss levels and 1980 prices, annual economic losses to producers from predation of livestock may be estimated at \$75 to \$150 million, and added costs to consumers at \$200 to \$400 million. Sheep and goat losses substantially greater than the figures quoted have been reported by Texas and by individual producers in Texas and other states. The extent of losses of livestock to predation in the eastern states is not known, but losses do occur and they appear to be increasing. Research studies tend to support the survey data and loss estimates.

The hazards of losses to predation limit the stocking of sheep and goats, with the consequent loss of the advantage of using mixed classes of livestock to control undesirable vegetation and to obtain efficient use of range forage. Adverse social and economic impacts upon rural families and communities result from both the direct losses to predation and the secondary effects that follow.

Jahnke (1983) evaluated costs of predation to Wyoming sheep producers in 1981. He estimated total direct and indirect predation costs at \$4.81 per head for the estimated 990,000 stock sheep reported in Wyoming for 1981. According to Jahnke (page 48), the total costs, were as follows:

Table 12. Summary of estimated direct and indirect costs of predation to the Wyoming sheep industry, 1981.

Cost category	Cost estimate
Direct costs ¹	\$2,979,000
Indirect costs	
Out-of-pocket expenditures	\$1,049,400
Predatory animal tax ²	273,900
Predation replacement costs	458,700
Total indirect costs	1,782,000
TOTAL	\$4,761,000

¹Source, Wyoming Agricultural Statistics, 1982, Wyoming Crop and Livestock Reporting Service (1982).

²Source, Annual Report, Department of Revenue and Taxation, Ad Valorem Tax Division (1982).

PREDATION CONTROL RESEARCH

Research on predation control methods and the results of control efforts have also been limited. O'Gara (1981) reported data from a field study of golden eagle predation on domestic sheep in Montana as follows:

A limited study on predation was conducted near the end of the 1974 lambing season on 2 ranches near Dillon, Montana. Predation by golden eagles (*Aquila chrysaetos*) accounted for 76% of lamb deaths detected (44 of 58). Overall docking percentage was 55% (55 lambs per 100 ewes, versus 90% reported for years before serious eagle problems developed. Based on the assumption that eagle predation caused 76% of all lamb deaths, and the 55% docking rate, the ranchers estimated a total eagle kill of 1,092 lambs valued at about \$38,000. The U.S. Fish and Wildlife Service livetrapped and removed 357 golden eagles from the ranches during the next 6 springs. During 1975 when 145 eagles were removed, docking percentages were even lower than in 1974, and the ranches estimated a loss of \$48,000. During 6 hours on 1 ranch in 1975, I found 15 fresh eagle kills. Less severe eagle problems occurred from 1976 through 1980 compared to 1974 and 1975, and the docking percentages improved but only once exceeded 90%. Trapping undoubtedly reduced lamb losses, but the magnitude of reduction could not be evaluated. Losses were greatest during the years of greatest trapping success. Decreasing lamb losses after 1975 may have resulted from increasing populations of jackrabbits (*Lepus* spp.) throughout the West. Juvenile and subadult golden eagles caused most of the predation. A decline of jackrabbits may have caused young birds, without established territories, to concentrate on the lambing grounds. As numbers of sheep decline on western ranches, eagles may take a greater percentage of lambs from the remaining herds. With golden eagles totally protected, predation on lambs should be expected whenever natural prey is scarce over large areas. Because of the expense and the relative scarcity of qualified personnel, the trapping and moving of depredating eagles is not a practical operational procedure. Nonlethal methods of eagle management show little promise for alleviating lamb losses. Experiments should be conducted combining scare tactics, including shooting near the birds, with limited killing for reinforcement. Illegal control may result in the killing of many golden eagles as well as bald eagles (*Haliaeetus leucocephalus*) and other large raptors if ranchers are not assured of aid when a serious depredation problem occurs.

Following extensive experience in evaluating predation in the field and in exposure to environmental groups and livestock producers, O'Gara (1982) made the following comments:

Statements and attitudes of some scientists, resource managers, and members of the environmental community have created a deep sense of distrust among ranchers who have experienced heavy losses of livestock to predators. Further polarization will continue until the predator-livestock problem is acknowledged, and resource interests join with ranchers to find and apply management techniques that are effective and still compatible with sound management of predator populations.

Undesirable effects of the alienation of stockmen include:

1. Stockmen generally refuse to cooperate in land-use planning and other environmental issues with groups they feel have accused them of everything from ignorance to fraud.
2. Peer support increases and illegal control activities can occur. These activities may be more damaging to predator populations and are almost certain to be less selective than sensible, effective, legal control programs.

3. The credibility of resource interests in general is eroded whenever ridiculous statements or insinuations concerning predators and livestock surface.

Due to inadequate methods to control golden eagle depredation on lambs, O'Gara and others evaluated scarecrows and harassment of eagles by shooting to reduce lamb losses. O'Gara and Matchett (1985) reported that:

Scarecrows and harassment help prevent eagle predation on lambs....Scarecrows are a technique that ranchers can use...and...are probably the only deterrent that does not require constant energy or human participation....a general increase in human activity (accompanied with early harassment) around lambing bands helps the efficacy of scarecrows...(these) are the best available means of protecting range lambing bands...they provide some degree of protection...

The well-known concept among professional ADC staff that removal of adult coyotes and/or litters of pups involved in predation on sheep reduces these losses was found to be accurate in a limited study in Wyoming by Till (1982). He reported that:

Bands of domestic sheep lambing on the open range in south central Wyoming were monitored for predator losses prior to and following coyote (*Canis latrans*) removals. Experimental treatments, including 1) no removal (control), 2) removal of 2 adults and their pups, and 3) removal of pups only, were replicated 15 times each. Number of predation incidents (events) was reduced 98.2% by removing adults and pups. The number of sheep killed was reduced by 98.8%. Removing only litters of pups resulted in a decrease of 87.7% in predation incidents, while total kills decreased 91.6%. Overall, 23 of 30 predation sequences terminated immediately, while in all cases predation ceased within 3 days after removing adult coyotes and/or their pups. In terms of "offending individuals", denning can be a very selective means of coyote depredation control. The data suggest that removing only litters can be nearly as effective in stopping losses as removing offending adults. Biological parameters such as litter size did not appear to influence kill frequencies. A cost-effectiveness analysis was calculated.

Connolly (1981) examined cost effectiveness of the professional ADC program and summarized his findings as follows:

Most governmental coyote control in the United States is carried out by the Federal-Cooperative Animal Damage Control (ADC) Program, which is managed by the U.S. Department of the Interior, Fish and Wildlife Service. More than half of the program funds spent to protect livestock from predators are contributed by non-Federal cooperator. In 1977, the ADC program spent about \$10.9 million to protect livestock in 16 western states. Of this total, some \$7.3 million were spent to protect sheep. In that same year, predators (mostly coyotes) killed sheep and lambs valued at about \$18 million. Based on a comparison of sheep loss to predators in different studies with and without predator control, the value of sheep lost to predators in 1977 theoretically could have been as high as \$66 million without predator control. Actually, livestock producers would probably sell their sheep before such high loss levels were reached.

In the western United States from 1971 through 1980, ADC program expenditures for predator control to protect sheep increased 170%. Numbers of sheep protected or impacted by the program declined 32%, but ranchers requests for ADC program assistance in protecting livestock rose 34%. Three legal control methods were banned or lost from use by the ADC program as governmental policy changed to deemphasize the reduction of wildlife-caused damage in favor of environmental protection and social acceptability of ADC program activities.

The net result of these trends is that cost effectiveness of ADC program efforts to protect livestock has declined. However, current ADC policy does not include cost effectiveness as a program goal.

Examination of the costs and benefits of the ADC program to control predation has not been extensive. However, Pearson and Caroline (1981) estimated that the program in central Texas provided a cost-benefit ratio of 1:4.5 in 1975. Pearson and Caroline also examined data given by Neilsen and Curle (1970) for Utah range sheep production in 1969 and estimated an approximate cost-benefit ratio of 1:6.2. Thompson (1976) evaluated data from the ADC program in California, using trapping as the primary control method, and projected a cost-benefit ratio to agricultural producers of 1:3.9 for fiscal year 1975. A more recent study evaluated the California program and data on ADC activities in much greater detail. The report included the following estimated ranges for the cost-benefit ratios, primarily for predator and rodent damage control (Berryhill 1984):

Cost-benefit ratio to agricultural producers; 1:6.9 to 1:11.5
Cost-benefit ratio to the general public; 1:18.09 to 1:30.14

Efforts to develop or improve predator control methods have been limited by the extensive cost and time required to separate and quantify the results of application. Exclusion fences, guard dogs and donkeys, sonic and light repellents are among the methods which have been studied, in addition to the work reported by O'Gara and Matchett (1985) on scarecrows, etc., to repel eagles. While all of these and other methods may be effective in certain situations, none are uniformly successful in preventing or reducing predation on livestock and relatively little new information has emerged. Linhart (1983) has summarized a majority of such studies in his review. Other reports on these studies may be found in the

proceedings of these Vertebrate Pest Conferences, the Great Plains Wildlife Damage Control Workshops, the Wildlife Symposium held in Idaho (Peek and Dalke 1981), the Journals of Wildlife and Range Management, and various other sources.

There is a need for improved methods to identify the cause of livestock deaths and, where predation occurs, the predator species responsible. Although Schaefer et al. (1981) and O'Gara (1982) found that ranchers were generally accurate in assessing predation, Roy and Dorrance (1976) developed a manual to aid in identification of the cause of livestock deaths. More recent publications on this subject are also available (Bowns and Wade 1985, Wade and Bowns 1985). These have been used in training biologists, ranchers, and others in identifying predation and other causes of loss to develop more accurate data.

While new predation control methods have not been found, extensive research and field tests of Livestock Protection (LP) Collars (also called "Toxic Collars") containing Compound 1080 suggest that this method for protection of sheep and goats from coyotes can be effective and useful. LP Collars were first used nearly 30 years ago and have been improved. Reports from research and field tests (Connolly 1980, Wade and Connolly 1980, Texas Agricultural Experiment Station 1983, Scrivner et al. 1985a) indicate that LP Collars were effective in removal of coyotes directly involved in killing of sheep and goats where appropriate management of LP Collared flocks and other livestock was possible.

The research on Compound 1080 in LP Collars had begun by the USFWS in 1977 (Connolly 1980) and indicated promise that LP Collars would be useful. However, the "Andrus Policy" forced others to become involved in order for this research to continue. The following discussion describes events which followed the Andrus decision to prohibit further USFWS research on Compound 1080 and related actions which ultimately led to registration of Compound 1080 for use in LP Collars.

During May 1980 USDI Secretary Andrus requested a cooperative agreement with Texas A&M University (TAMU) to continue research on Compound 1080 for use in LP Collars. This agreement was developed and a cooperative research project continued from 1980 to 1983 under Experimental Use Permits (EUPs) issued to the USFWS and TAMU. During 1980 the Texas and New Mexico Departments of Agriculture were denied EUPs for the same purpose. However, an EUP was granted to the New Mexico Department of Agriculture early in 1981, following President Reagan's assumption of office. Later in 1981 the new USDI secretary, James Watt, issued an order for formulation of a "new policy and direction" for the ADC program. The new policy was issued by the USFWS director, Robert Jantzen, late in 1981 and included a statement of intent to further develop use of chemical control methods.

As a consequence of the congressional hearings in 1980 and other factors, the EPA held 3 days of evidentiary hearings on predation, predator control, the use of Compound 1080, and related issues in July 1981 at Denver, Colorado, and Washington, D.C. Late in 1981 the EPA released a summary report of the hearings and announced its intent to conduct formal administrative hearings on these issues. These formal hearings began in March and concluded in August 1982. The Court's "Initial Decision" by EPA Administrative Law Judge Spencer T. Nissen was issued in October 1982 (Nissen 1982). This decision supported EPA registration of Compound 1080 for use in LP Collars and single-lethal-dose (SLD) baits if sufficient data were provided for a registration by the EPA, but denied authorization to register the chemical for other methods of use (large meat baits and "smear posts").

The EPA "Final Decision," which supported the Initial Decision, was issued in October 1983 (Thomas 1983). Immediate appeals of the Final Decision by opponents and supporters of Compound 1080 were made to the Tenth Circuit Court of Appeals. Following its hearing of argument in January 1985, in September 1985 the Appeals Court issued its opinion which supported the EPA decisions authorizing such registration (USCA, Tenth Circuit 1985).

In July 1985, the EPA approved the USFWS request (first submitted in September 1981) for registration of LP Collars (Moore 1985a). However, because the USFWS did not intend for its staff to use LP Collars in the ADC program, specific state registrations are required for this purpose. Specific training material for applicators of Compound 1080 in LP Collars was prepared and is available to state or federal agencies responsible for such training. The training material contains an outline and description of its components which are: two 35-mm slide sets (Bowns and Wade 1985, Wade 1985a), a bulletin on evaluation of livestock losses (Wade and Bowns 1985) and an applicator's manual (Wade 1985b). At this time (March 1986) the Wyoming Department of Agriculture has nearly completed the registration process (Welles 1986) and plans to initiate training of LP Collar applicators later this year. Some other states also have indicated interest in LP Collar registrations for use in protection of sheep and goats.

OTHER CHEMICAL USES

The EPA has indicated that at present insufficient data are available to determine whether SLD 1080 baits can be used safely and effectively for the protection of livestock. As a consequence, the EPA has required that much additional specific data must be provided before a registration request will have adequate support. A limited amount of experimental research under an EPA EUP has been conducted by the USFWS during the past 4 years but at present it appears that much more will be necessary.

During the period from 1980 to the present, the USDI-FWS has applied for and received approval of other chemical uses for protection of wildlife species. These included an emergency exemption for use of diphacinone-treated SLD baits to protect Aleutian Canada geese from Arctic foxes on Amukta and Kiska Islands, Alaska, during 1983 to 1984. Also, the USDI-FWS received a "special local needs" registration for use of strychnine-treated eggs to protect wild duck nests on federal land in North Dakota from predation by Franklin's ground squirrels during 1983 to 1985. In 1981, the University of California at Davis received an EUP to examine the use of Compound 1080 in SLD "bait delivery units" to reduce coyote damage.

More recently, emergency requests by Montana and Wyoming for use of strychnine-treated eggs to protect humans and domestic animals from endemic skunk rabies were "tentatively denied" in late 1984 and early 1985 by the EPA. However, following extended discussion and negotiations between the EPA and state agencies, these emergency exemptions were granted in November 1985 to allow use of strychnine-treated eggs by Montana and Wyoming to November 1986 (Moore 1985b). However, the states were required to apply for full registration of strychnine for use in such baits under Section 3 of the Federal Insecticide, Fungicide and Rodenticide Act of 1972 (FIFRA), as amended, and must provide the data essential for Section 3 registrations within a specific time period.

OTHER POLITICAL ACTIONS

In addition to increased emphasis on environmental concerns in the use of chemical and mechanical predator control methods, various groups which are advocates of wildlife and domestic "animal rights" have become much more vocal. Some are attempting to prohibit hunting, trapping, fishing, and other consumptive uses of wildlife by public opposition, political action, and other methods. Attacks by some groups on laboratories and other research facilities which utilize animals have become common. Some of the groups are now moving in attempts to restrict domestic animal production for food and to limit or prohibit use of meat, dairy, and poultry products (Favre 1979, California Veterinary Medical Association 1983) and have become highly vocal on these issues.

In summary, the following factors appear to be evident:

Past USFWS policies adversely affected the ADC program and were a primary cause for transfer of the program to the USDA-APHIS.

Predator damage studies tend to support earlier research findings on the levels of livestock lost to predators.

Relatively little new information on predator damage control methods has emerged, with the exception of the use of Compound 1080 in LP Collars.

Data requirements and restrictions on chemicals for use in vertebrate animal control have increased.

The "animal rights movement" will become progressively more vocal and politically active.

LITERATURE CITED

- ANDRUS, C. D. 1979. Memorandum to the Assistant Secretary for Fish and Wildlife and Parks; Subject: The Animal Damage Control Program. November 8, 1979. 6 pp. (Mimeo).
- ANDRUS, C. D. 1980. Remarks of the Secretary of Interior to the Conference on Animal Damage Control, Austin, Texas, January 15, 1980. Texas Department of Agriculture, Austin. 5 pp. (Mimeo).
- BERRYHILL, C. 1984. Letter to Honorable Walter W. Stiern, Chairman, Joint Legislative Budget Committee, Sacramento, California. 1 p. with attachments re California Predatory Animal Control Program (21 pp.), November 14, 1984.
- BERRYMAN, J. H. 1985. Letter to Honorable William Clark, Secretary, U.S. Department of the Interior, January 28, 1985. International Association of Fish and Wildlife Agencies, Washington, D.C. 2 pp. with attachment.
- BOWNS, J. E., and D. A. WADE. 1985. Physical Evidence of Carnivore Depredation, (35-mm slide set with taped narrative and 41-p. script). Texas Agricultural Extension Service, College Station.
- CALIFORNIA VETERINARY MEDICAL ASSOCIATION. 1983. Special Issue: Animal Welfare and Animal Rights, California Veterinarian 37(1): 1-110.
- CONNOLLY, G. E. 1980. Use of Compound 1080 in Livestock Neck Collars to Kill Depredating Coyotes, A Report on Field and Laboratory Research, November 1978 - March 1980. U.S. Department of Interior, Denver Wildlife Research Center, Denver, CO. 125 pp. and 12 appendices.
- CONNOLLY, G. 1981. On cost effectiveness of coyote control to protect livestock. Proceedings: Symposium on Wildlife-Livestock Relationships, Department of Wildlife Resources, University of Idaho, Moscow. pp. 279-294.
- FAVRE, D. S. 1979. Wildlife rights: the ever-widening circle. Environmental Law 9:241-281.
- FULLERTON, E. C., and J. R. GRIEB. 1981. Letter to Honorable James Watt, Secretary of the Interior, November 6, 1981. International Association of Fish and Wildlife Agencies, Washington, D.C. 3 pp. with attachments.
- GRIEB, J. R. 1983. Letter to Mr. James G. Watt, Secretary, U.S. Department of Interior, (Undated), 1986. Jack R. Grieb, Chairman, ADC Committee, International Association of Fish and Wildlife Agencies, Washington, D.C. 1 p. with attachments.
- HOWARD, V. W. JR., and T. W. BOOTH. 1981. Domestic Sheep Mortality in Southeastern New Mexico. Bulletin 683, New Mexico State University, Las Cruces. 28 pp.
- JAHNKE, L. J. 1983. A methodology for assessing indirect costs of predation control: a study of Wyoming sheep producers. M.S. Thesis, University of Wyoming, Laramie. 78 pp.
- LINHART, S. B. 1983. Managing coyote damage problems with nonlethal techniques: recent advances in research. Proceedings: First Eastern Wildlife Damage Control Conference, Cornell University, Ithaca, N.Y. pp. 105-118.
- MacINTYRE, A. A. 1982. The politics of nonincremental domestic change: major reform in federal pesticide and predator control policy. Ph.D. Thesis, University of California, Davis. 876 pp.
- MOORE, J. A. 1985a. Memorandum from John A. Moore, EPA, to Jan Riffe, USDI, affirming conditional registration of Compound 1080 in Livestock Protection Collars, effective July 11, 1985, with attachments.

- MOORE, J. A. 1985b. Montana and Wyoming: Issuance of Specific Exemptions for Use of Strychnine to Control Rabid Skunks, by Environmental Protection Agency, Federal Register 50 (229): 48835-38.
- NISSEN, S. T. 1982. In the Matter of FIFRA Docket No. 502, Notice of Hearing on the Applications to Use Sodium Monofluoroacetate (Compound 1080) to Control Predators, Initial Decision, Environmental Protection Agency, Washington, D.C., October 22, 1982. 49 pp. and attachments A-C.
- NIXON, R. 1972. Executive Order 11643, Environmental safeguards for animal damage control on federal lands. Federal Register 37(27): 2875-76.
- O'GARA, B. W. 1981. Predation by golden eagles on domestic lambs in Montana. Proceedings: Symposium on Wildlife-Livestock Relationships. Department of Wildlife Resources, University of Idaho, Moscow. pp. 345-358.
- O'GARA, B. W. 1982. Let's tell the truth about predation. Transactions: North American Wildlife Conference 47: 476-484.
- O'GARA, B. W., K. C. BRAWLEY, J. R. MUNOZ and D. R. HENNE. 1983. Predation on domestic sheep on a western Montana ranch. Wildlife Society Bulletin 11(3): 253-264.
- O'GARA, B., and R. MATCHETT. 1985. Completion Report - 1985: Evaluation of Scarecrows For Frightening Golden Eagles From Lambing Bands. Cooperative Wildlife Research Unit, University of Montana, Missoula. 45 pp.
- PEARSON, E. W., and M. CAROLINE. 1981. Predator control in relation to livestock losses in central Texas. Journal of Range Management 34(6): 435-441.
- PEEK, J. M., and P. O. DALKE (Eds.). 1981. Proceedings: Wildlife - Livestock Symposium, University of Idaho, Moscow. 614 pp.
- ROY, L. D., and M. J. DORRANCE. 1976. Methods of Investigating Predation of Domestic Livestock. Alberta Agriculture, Edmonton, Alberta, Canada. 54 pp.
- SCHAEFER, J. M., R. D. ANDREWS and J. J. DINSMORE. 1981. An assessment of coyote and dog predation on sheep in southern Iowa. Journal of Wildlife Management 45(4): 883-893.
- SCRIVNER, J. H. 1985. The decline of the Angora goat industry in three Texas counties. Journal of Range Management 38(2): 158-162.
- SCRIVNER, J. H., and J. R. CONNER. 1984. Costs and returns of Angora goat enterprises with and without coyote predation. Journal of Range Management 37(2): 166-171.
- SCRIVNER, J. H., D. A. WADE, G. E. CONNOLLY and L. C. HOWARD JR. 1985a. Costs and other effects of predation on an Angora goat ranch. Rangelands 7(2): 54-57.
- SCRIVNER, J. H., W. E. HOWARD, A. H. MURPHY and J. R. HAYS. 1985b. Sheep losses to predators on a California range, 1973-1983. Journal of Range Management 38(5): 418-421.
- TEXAS AGRICULTURAL EXPERIMENT STATION. 1983. Efficacy of the 1080 Toxic Collar as a Predator Damage Control Method. Final Report to the Denver Wildlife Research Center, U.S. Fish and Wildlife Service. Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, 134 pp.
- THOMAS, L. M. 1983. Final Decision in FIFRA Docket No. 502, U.S. Environmental Protection Agency, Washington, D.C. 33 pp.
- THOMPSON, R. A. 1976. The cost of predator damage control using trapping as the primary control technique. Proceedings: Seventh Vertebrate Pest Conference, University of California, Davis. pp. 146-153.
- TILL, J. A. 1982. Efficacy of Denning in Alleviating Coyote Depredations upon Domestic Sheep. Report to U.S. Department of Agriculture, Contract 59-2491-02-112-0. M.S. Thesis, Utah State University. 36 pp.
- U.S. Court of Appeals, Tenth Circuit. 1985. Decision filed by the Tenth Circuit Court of Appeals, Denver, Colorado, in Re: No. 83-2380 and No. 84-1148, Petitions For Review of a Final Decision of the U.S.E.P.A., Dated October 31, 1983, September 19, 1985. 12 pp.
- U.S. House of Representatives. 1980. Animal Damage Control Act of 1980. Hearings before the Subcommittee on Department Investigations, Oversight and Research of the Committee on Agriculture. Ninety-Sixth Congress, Second Session, Serial No. 96-BBB. U.S. Government Printing Office, Washington, D.C. 305 pp.
- U.S. Department of Interior, Fish and Wildlife Service. 1980. Service Management Plan, U.S. Department of Interior, Washington, D.C. 51 pp.
- U.S. General Accounting Office. 1981. National Direction Required For Effective Management of America's Fish and Wildlife, CED-81-107, August 24, 1981. U.S. General Accounting Office, Washington, D.C. 93 pp.
- U.S. Senate. 1980. Animal Damage Control Program Policy Changes Oversight. Hearings before the Committee on Environment and Public Works, Ninety-Sixth Congress, Second Session, Serial No. 96-H52, U.S. Government Printing Office, Washington, D.C. 595.
- WADE, D. A. 1980. Predator damage control, 1980: recent history and current status. Proceedings: Ninth Vertebrate Pest Conference, University of California, Davis. pp. 189-199.
- WADE, D. A. 1982. Impacts, Incidence and Control of Predation on Livestock in the United States, With Particular Reference to Predation By Coyotes. Special Publication No. 10, Council for Agricultural Science and Technology, Ames, Iowa. 20 pp.
- WADE, D. A. 1985a. Procedures For Use of Livestock Protection Collars and Other Methods to Reduce Predation, (35-mm slide set with taped narrative and 18-p. script). Texas Agricultural Extension Service, College Station.
- WADE, D. A. 1985b. Applicator Manual For Compound 1080 In Livestock Protection Collars. Bulletin B-1509, Texas Agricultural Extension Service, College Station. 52 pp.
- WADE, D. A., and J. E. BOWNS. 1985. Procedures For Evaluating Predation on Livestock and Wildlife. Bulletin B-1429 (Revised), Texas Agricultural Extension Service, College Station. 42 pp.
- WADE, D. A., and G. E. CONNOLLY. 1980. Coyote predation on a Texas goat ranch, Texas Agricultural Progress 26(1): 12-17.
- WELLES, J. G. 1986. Intent to approve amendment to Wyoming Pesticide Applicator Certification Plan. Federal Register 51(14): 2964-2965.

APPENDIX A

A brief chronology of some events related to cancellation/suspension of the predacides (Compound 1080, strychnine, sodium cyanide) by the Environmental Protection Agency in 1972 and ensuing actions by federal and state agencies.

- 1964: The Leopold Committee report on "Predator and Rodent Control in the United States," to the U.S. Department of Interior was made public. The report charged the U.S. Fish and Wildlife Service - Animal Damage Control program with indiscriminate, nonselective and excessive predator control. However, the report stated that Compound 1080 baits are a relatively humane and effective method of coyote damage control.
- 1971: March: Civil actions were filed by counsel for the Defenders of Wildlife, Sierra Club, and the Humane Society of the United States, against the USDI et al. in the U.S. District Court, District of Columbia, requesting an injunction prohibiting the use of toxic chemicals for wildlife damage control and certain other relief.
- April: Appointment of the Cain Committee by USDI Secretary Rogers Morton, which began its review of the USFWS - ADC program of predator and rodent damage control.
- November: A stipulation regarding the above-mentioned civil actions was filed under seal in the U.S. District Court, District of Columbia, in which the USDI et al. agreed to end the use of chemicals for predator damage control prior to February 15, 1972. Plaintiffs in the civil action named above agreed not to pursue the injunctions requested of the District Court prior to February 15, 1972. The stipulation was signed by counsel for the plaintiffs and the defendants.
- December: The Cain Committee report. "Predator Control - 1971," was completed and published by the USDI. The report was highly critical of the ADC program and recommended prohibition of the use of toxic chemicals.
- 1972: January: The Cain Committee report was released to the public by the USDI.
- February 8: Issuance of Executive Order No. 11643 by President Nixon, cancelling use of toxic chemicals on federal lands and in federal programs, except for emergency use by prior agreement of the Secretaries of USDI, USDA, and HEW, and the Administrator of the EPA.
- February 10: The USDI issued a news release stating that it had ceased use of toxic chemicals in the USFWS - ADC program for control of birds, rodents, and other species and was removing all such chemicals from the field as rapidly as possible.
- March 9: The EPA issued cancellation and suspension notices for Compound 1080, strychnine, sodium cyanide, and thallium sulfate. (1080 registration as a predacide was held only by the USDI-FWS.) A 30-day period was provided for appeal for a hearing in the notice of cancellation but no hearing was required by affected agencies or organizations.
- March and May: Stipulations of dismissal of the civil actions by Defenders of Wildlife et al. vs. USDI et al. signed by counsel for plaintiffs and defendants were filed with the U.S. District Court, District of Columbia.
- 1972 to 1974: A series of U.S. Congressional hearings were held on the USDI-ADC program, the pros and cons of ADC and predacides, rodenticides, and related factors.
- Numerous repeated requests and applications by several western states for reregistration of the predacides (1080, strychnine, and sodium cyanide) were denied by the EPA.
- 1974: February: Experimental use of sodium cyanide (in the M-44) was granted to the State of Texas.
- March (to February 1975): Experimental/emergency use of sodium cyanide (in the M-44) was granted to Montana, California, South Dakota, Idaho, Nebraska, Kansas, Texas A&M University, and the USDI-ADC.
- May: A civil action was filed by the State of Wyoming et al. against the EPA and USDI et al. seeking injunctive relief from EPA Order PR 72-2, etc., and requesting operational use of the predacides in the USDI-ADC program on all classes of land in Wyoming.
- 1975: June: U.S. District Court, Cheyenne, Wyoming, granted the State of Wyoming, et al. preliminary injunctive relief from EPA Order PR 72-2 which canceled registration of the predacides and suspended their legal interstate shipment.
- June: The preliminary injunction granted the State of Wyoming et al. by the U.S. District Court, Cheyenne, was appealed to the 10th Circuit Court of Appeals by the EPA and USDI et al.
- July 22: President Ford issued Executive Order No. 11870 authorizing experimental use of sodium cyanide in federal programs and on federal lands.

August: The EPA authorized experimental use of sodium cyanide in toxic collars to be used on the necks of sacrificial lambs for removal of sheep-killing coyotes. (This chemical-collar combination was consistently ineffective in all field trials during 1975-1976.)

August: The Wyoming Department of Agriculture conducted pesticide applicator training and certified a number of applicants for the use of Compound 1080 in meat baits for predator damage control under a Wyoming state label registration.

September: The EPA reregistered sodium cyanide for use in the M-44 in predator control by the USDI-ADC and several western states, including Texas.

October: The 10th Circuit Court of Appeals reversed the U.S. District Court ruling which had granted injunctive relief to Wyoming from EPA Order PR 72-2, thereby reinstating the federal cancellation/suspension of Compound 1080 for predator control.

November: Wyoming Department of Agriculture certified pesticide applicators began use of 1080-treated meat baits for predator control on private and state lands in Wyoming. These were used into Spring 1976, and again November 1976 to Spring 1977.

1976: February: The State of Wyoming et al. filed for review of the 10th Circuit Court of Appeals' October 1975 decision by the U.S. Supreme Court.

May: The U.S. Supreme Court refused the request for review by the State of Wyoming et al., thus upholding the 10th Circuit Court of Appeals' decision reinstating federal cancellation/suspension of Compound 1080.

May 28: President Ford issued Executive Order No. 11917 authorizing operational use of sodium cyanide in federal programs and on federal lands, with certain restriction imposed on its use.

September 9: A civil action was filed against the Wyoming Department of Agriculture et al. by the EPA in the U.S. District Court, Cheyenne, Wyoming, alleging misuse of Compound 1080 by inshipment of the Compound from out of state and by use in meat baits for predator control.

A civil action was filed against USDI, USDA, HEW, EPA, et al. by the State of Wyoming et al. (including the State of Texas), in the U.S. District Court, Cheyenne, Wyoming, requesting the Court to authorize and order the registration and use of Compound 1080, strychnine, and sodium cyanide on private, state, and federal lands, and to invalidate orders by the EPA denying registration of 1080 to the States of Wyoming and South Dakota. (Plaintiffs and intervenors in support included the States of Wyoming, Montana, Idaho, New Mexico, Utah, South Dakota, Texas; the National Wool Growers' Association, and the National Cattlemen's Association.

November: (to Spring 1977): Pesticide applicators certified by the Wyoming Department of Agriculture applied 1080-treated meat baits for predator control on private and state lands in Wyoming.

December 1: A Federal Register notice of intent was filed by the EPA to proceed with RPAR action against Compounds 1080, 1081, and strychnine for all uses and all purposes (primarily field rodent and bird damage control at this time).

1977: October: A permit for experimental use of Compound 1080 in toxic collars on the necks of sacrificial sheep to remove sheep-killing coyotes was granted to the USDI by the EPA. This permit extended to October 1978, and was renewed to October 1979. Results were generally effective in selected cases but the method is not consistently effective.

1978: February 22: The civil action by the EPA against the Wyoming Department of Agriculture et al. alleging misuse of 1080 for predator control was dismissed by the U.S. District Court, Cheyenne, Wyoming, in accord with an agreement reached by counsel for the prosecution and defense.

February: The "Animal Damage Control Policy Study Advisory Committee" with advisory duties only, was appointed by the Secretary of the Interior to review the USDI-ADC program, policies, and the use and interpretation of data regarding predator damage/control. The committee is to terminate in July 1978.

May: The EPA rejected the Montana Department of Livestock application of September 1977 for experimental use of SLD 1080 baits to reduce coyote predation on livestock.

Late May: The first draft report, Predator Damage Management in the West, was released by the USDI.

May 22-31: Public hearings on the draft USDI-ADC report and related matters were held at Boise, Idaho; Casper, Wyoming; San Angelo, Texas and Washington, D.C.

June 12: The second draft report, Coyote Management in the West: A Study of Alternatives, was prepared by USDI.

December: The final report, Predator Damage in the West, A study of Coyote Management Alternatives, was prepared by USDI and released to the public in 1979.

1972 to 1979: All applications/requests for registration of 1080 and strychnine from several western states were denied by the EPA. Occasional emergency use of strychnine for rabies control was permitted in several western states by the EPA, and an emergency permit for use of 1080 in control of Columbian ground squirrels was granted to the State of Montana.

1974 to 1979: The civil action against EPA et al. filed in the U.S. District Court, Cheyenne, Wyoming, by the State of Wyoming et al. was repeatedly continued/postponed.

1979: January: A draft option paper regarding USFWS-ADC predator damage management options/alternatives was supposedly provided to the Secretary of the Interior by U.S. Fish and Wildlife Service-ADC Staff. Decisions by the Secretary, on the options/alternatives originally scheduled for January 1979 were repeatedly postponed until November 8, 1979.

June: The Tenth Circuit Court of Appeals granted a petition by Cecil D. Andrus (USDI) and Douglas Costle (EPA) and issued a writ of mandamus compelling the United States District Court of Wyoming to carry out the mandate of the October 1975 decision by the Tenth Circuit Court of Appeals, thus effectively closing the case by the State of Wyoming et al. vs. EPA et al.

June: The Department of Interior, U.S. Fish and Wildlife Service released the Final Environmental Impact statement on Mammalian Predator Damage Management for Livestock Protection in the Western United States to the public.

July 23: A cooperative field test of 1080 toxic collars was begun in Bosque County, Texas, on the L. C. Howard Ranch under direction of the Texas Agricultural Extension Service and the U.S. Fish & Wildlife Service.

October: Intervenors and plaintiffs, other than the State of Wyoming, reached agreement to dismiss the suit by Wyoming et al. vs. EPA et al.

Mid-October: The USDI 1080 toxic collar permit was renewed through November 30, 1980, by the EPA.

November 8: Secretary of the Interior Cecil D. Andrus issued his long-delayed ADC policy statement in a memorandum to the Assistant Secretary for Fish, Wildlife and Parks. The document generally ignored recommendations contained in numerous position statements from ADC professionals in research and operations.

Major points in the new policy included prohibition of denning and all further research and development on Compound 1080, additional restrictions on aerial hunting, emphasis on non-lethal noncapture and husbandry methods, in addition to the intent to phase out all lethal control methods.

1980: January: Opposition to the new USDI-ADC policy appeared to be growing in the agricultural sector. USFWS and other professionals in ADC research and operations indicated the lack of factual considerations and objectivity, other than political, in the policy.

January 15: A predator Summit Conference was held in Austin, Texas. In his discussion, USDI Secretary Andrus reiterated his perception of society's opposition "to denning and the use of Compound 1080 as repulsive and inhumane practices". However, on January 15 he did receive "new information" regarding secondary hazards and indicated that he might reconsider his prohibition of all further research/development/use of Compound 1080.

January 22: Senate Bill S-2195 was introduced by Senator John Tower of Texas. The bill would require the Secretary of Interior, in cooperation with the Secretary of Agriculture, to implement certain procedures relating to ADC, including the use of Compound 1080, and extensive research relating to chemical toxicants, their efficacy, hazards, costs, benefits, etc.

January 30: Telephone communication from USFWS administrators to USFWS research staff gave permission to continue the 1080 toxic collar tests at Meridian, Texas, which were being conducted under a cooperative agreement between the Texas Agricultural Extension Service of Texas A&M University, the USFWS-Denver Wildlife Research Center, and a Texas rancher. Confirmation of this permission by memoranda was requested from the USFWS staff in Washington.

February 15: The Western Regional Coordinating Committee for Predator Research (WRCC-26) issued an analysis of and response to USDI Secretary Andrus' ADC policy statement of November 8, 1979. The WRCC-26 analysis described inaccuracies and misconceptions in the USDI policy statement and stated that "Our findings and experience indicate that the recent ADC policy statement issued by Secretary Andrus is not based on established fact or competent professional judgment."

February 20: USDI Secretary Andrus met with a delegation of western senators regarding the ADC program and his new USDI policy.

February 21: By telephone, Denver Wildlife Research Center staff were informed that, as agreed upon by USDI Secretary Andrus and western senators, the 1081 toxic collar tests in Texas would be permitted to continue in accord with the agreement between the researchers and the rancher but no other 1080 toxic collar tests would be permitted (by USDI staff) and that written confirmation of this position would be provided to toxic collar research staff and the rancher.

February 28: The RPAR action against 1081 by EPA was terminated. Registration of 1081 for control of Norway and roof rats was continued under a modified label accepted by the EPA.

March 3: The USFWS-Denver Wildlife Research Center was informed by official memorandum that 1080 toxic collar tests at Meridian, Texas, could continue.

March 6: H.R. 6725 was introduced by Congressmen Eligio de la Garza and Thomas Loeffler of Texas. The bill would require the Secretary of Interior, in cooperation with the Secretary of Agriculture, to implement certain requirements relating to animal damage control and for other purposes, including use of lethal chemicals and devices, extended research on chemical toxicants, research on nonlethal and animal husbandry techniques, and use of preventive control methods to manage predator populations.

March 17: Texas A&M University and cooperating ranchers were informed by official memorandum from USDI that 1080 toxic collar test at Meridian, Texas, could continue through the "period of agreement," presumably to the expiration date (November 30, 1980) of the USDI 1080 toxic collar Experimental Use Permit (EUP).

April 16-17: Hearings before the U.S. House of Representatives Subcommittee on Department Investigations, Oversight and Research of the Committee on Agriculture, related to predator damage control, the new USDI-ADC policy, H.R. 6725, and related issues were held.

April 17: The implementation plan for USDI Secretary Andrus' new ADC policy received final approval by USDI Assistant Secretaries for Fish, Wildlife and Parks; Land and Water Resources; and Policy, Budget and Administration.

April 24-25: Hearings before the U.S. Senate Committee on Environment and Public Works related to predator damage control, the new USDI-ADC policy, and related issues were held.

April 25: Texas A&M University submitted a request to EPA for an Experimental Use Permit for the 1080 toxic collar to continue research on potential primary and secondary hazards, safety, and other factors related to 1080 use for protection of sheep and goats in Texas.

May 7: USDI Secretary Andrus issued a news release reporting that USDI was seeking an agreement with Texas A&M University to continue 1080 toxic collar research.

May 9: The Texas Department of Agriculture submitted application to EPA for an Experimental Use Permit for the 1080 toxic collar.

May 12: The EPA issued a Conditional Experimental Use Permit to Texas A&M University for 1080 toxic collar research.

May 20: The RPAR actions by the EPA against strychnine and 1080 continued with decisions pending.

Late May-September: USDI, EPA, and Texas A&M University staff held discussions on 1080 toxic collar cooperative research projects in Texas; a research plan and budget were developed and submitted by Texas A&M University to the Department of Interior for funding.

June 5: The New Mexico Department of Agriculture submitted an application to EPA for an Experimental Use Permit for the 1080 toxic collar use by ranchers to evaluate its safety and effectiveness in New Mexico.

August: USFWS staff was informed by the USDI that additional new 1080 toxic collar tests could be initiated in Texas by the USFWS and that the USDI would apply for a renewal of its 1080 toxic collar Experimental Use Permit which expires on November 30, 1980.

August 5: The EPA notified the New Mexico and Texas Departments of Agriculture that their requests for 1080 toxic collar Experimental Use Permits were denied.

1981: January 20: Ronald Reagan took office as President of United States.

February 3: The EPA granted a 1080 toxic collar Experimental Use Permit to the New Mexico Department of Agriculture.

May 6: A national position paper on animal damage control was issued by a coalition of 13 major U.S. agricultural groups including the major livestock producer associations.

July 28,29,31: The EPA held evidentiary hearings on predation, predator control, the use of 1080, and related factors at Denver, Colorado, and Washington, D.C.

August 19: The EPA granted extension of the New Mexico 1080 toxic collar EUP to February 3, 1982.

September 21: The USFWS applied to the EPA for registration of the 1080 toxic collar.

September 22: USDI Secretary James Watt issued a directive to the USFWS to formulate a "new policy and direction" for the ADC program "notwithstanding previous secretarial policy decisions and in line with the best currently available biological information."

October 15: The EPA granted extension of the Texas A&M University 1080 toxic collar EUP to December 1, 1982.

November 19: USFWS Director Robert Jantzen issued a "new ADC policy" stating that the USFWS (1) has applied for registration of the 1080 toxic collar, (2) will apply for a 1080 single-lethal-dose EUP, and (3) will request the EPA to modify 10 of the current 26 M-44 restrictions to permit use of the M-44 "to protect endangered wildlife."

November: The EPA released "Predacidal Uses of 1080: Technical Review Document," a summary review by EPA staff of information from the evidentiary hearings held July 28-31, 1981, at Denver and Washington, D.C.

December 1: The EPA announced its intent to hold formal adjudicatory hearings on the risks and benefits of Compound 1080 use for predator control.

December 2: The USFWS applied to the EPA for an EUP to evaluate 3.0-mg 1080 single-lethal-dose baits for coyote control to protect livestock at test sites in Idaho, Montana, and Texas.

December 17: An application for experimental use of Compound 1080 in single-dose "Bait Delivery Units" in California was submitted to the EPA by Dr. W. E. Howard, University of California.

1982: January 25: The Northern Prairie Wildlife Research Center, U.S. Department of the Interior, was granted a FIFRA 24 C registration of strychnine egg baits by the North Dakota State Laboratory for control of Franklin ground squirrel predation on wild duck nests.

January 27: President Reagan issued Executive Order 12342 revoking Executive Order 11643 (as amended by Executive Orders 11870 and 11917) which had prohibited use of toxic chemicals in federal programs and on federal lands.

March 9: The U.S. EPA acknowledged receipt of the USDI (24 C) registration of strychnine egg baits in North Dakota and approved the registration.

March 30: The EPA hearings on risks and benefits of Compound 1080 use for predator control began at Washington, D.C., under EPA Administrative Law Judge Spencer T. Nissen.

April 19: Based on laboratory tests of the LD 100 in coyotes, the USFWS notified the EPA of the need for 5.0-mg doses of 1080 in SLD baits (rather than 3.0-mg doses) and of the USFWS intent to utilize 5.0-mg doses in experimental field tests when the USFWS-EUP for experimental use is approved by the EPA.

May 25: The EPA hearings on 1080 risks and benefits began at San Angelo, Texas.

June 7: The EPA hearings on 1080 risks and benefits began at Denver, Colorado.

June 28: The EPA hearings on risks and benefits resumed at Washington, D.C.

August 6: The EPA hearings on risks and benefits terminated at Washington, D.C.

October 4: The EPA issued an EUP to the USFWS for experimental use of 3.0-mg 1080 SLD baits in Idaho, Montana, and Texas.

October 22: EPA Administrative Law Judge Spencer T. Nissen issued the Initial Decision from the 1080 hearings which recommended registration of 1080 toxic collars and single-lethal-dose baits if adequate data on safety, etc., were provided by applicants for registration.

November 9: The USFWS requested that the EPA extend the USFWS toxic collar EUP from November 30, 1982, to November 30, 1983.

December 1: The 1080 toxic collar EUP granted to Texas A&M University by the EPA expired and was not renewed. The TAMUS terminated its toxic collar field research project; however, the toxic collar project at the Howard Ranch, Meridian, Texas, continued under USFWS supervision and the USFWS EUP.

1983: January 11: The USFWS issued a formal request to the EPA for modification of the USFWS 1080 single-lethal-dose bait EUP to permit use of 5.0-mg 1080 per bait and for changes in the test areas.

January-March: Extensive news media coverage of allegations and accusations of unethical conduct, undue industrial influence on EPA policies and regulations, and misuse of the toxic wastes "super-fund" by EPA administrators were followed by congressional oversight hearings during March in regard to these allegations.

March 1: The Humane Society of the United States petitioned the EPA to reconsider and revoke the 1080-SLD bait EUP issued to the USFWS for violations of the EUP alleged by the HSUS.

March 9: EPA administrator Ann Gorsuch Burford resigned from her position; other resignations and dismissals of upper-level EPA administrators followed.

March 11: The EPA issued a "cease and desist" order to the USFWS in regard to use of 1080 SLD baits containing more than 3.0-mg 1080 and their use in areas not listed on the original EUP granted, to the USFWS, stating that: "Although you have requested a modification...to allow higher concentrations and additional geographic areas this modification has not yet been approved (sic)...."

March 21: William D. Ruckelshaus was nominated by President Reagan to succeed EPA Administrator Burford.

April 7: The USFWS-DWRC informed its cooperators in 1080 toxic collar research that, despite repeated assurance from EPA staff that continuation of the toxic collar research was permissible, the USFWS will stop field research with the collars until the EUP is renewed.

April 12: The USFWS requested the EPA to advise the USFWS of the status of its application of November 9, 1981, for extension of the USFWS 1080 toxic collar EUP to November 30, 1983. The USFWS also notified its cooperators that 1080 toxic collars must be removed from the field.

April 19: Cooperative USFWS-TAMU 1080 toxic collar tests in Texas were terminated with removal of collars from Angora goats used on the field test project at Meridian, Texas.

April: The USFWS was granted an emergency exemption by the EPA to permit USFWS use of a maximum of 50,000 single-lethal-dose baits containing diphacinone from May 1, 1983, to April 30, 1984, "to eradicate arctic foxes, a predator of the Aleutian Canada goose, on Amukta and Kiska Islands, Alaska."

May 3: The EPA notified New Mexico authorities that the EPA had decided to publish for public review and comment all pending requests for 1080 EUPs "to solicit comments from interested parties..."

May 17: USFWS administrators and staff met with EPA officials "to discuss the status of three situations concerning 1080":

1. The EPA revocation of the USFWS 1080-SLD bait EUP and preparation of a new application for a 1080 SLD bait EUP.
2. The USFWS request of November 9, 1982, for extension of the 1080 toxic collar EUP to November 30, 1983.
3. The USFWS was advised by EPA officials not to expect further communication until the "administrator has issued an opinion concerning the recommendations (of October 22, 1982) of the Administrative Law Judge...."

September 30: The EPA released strychnine "Position Document 4" for public review.

October 19: The EPA issued a Federal Register notice of "Intent to Cancel Registrations of Pesticide Products Containing Strychnine; Denial of Applications for Registration of Pesticide Products Containing Strychnine; Determination Concluding the RPAR; Availability of Position Document (PD-4)."

October 31: EPA Assistant Administrator Lee Thomas issued the "Final Decision" by EPA affirming ALJ Nissen's "Initial Decision" of October 22, 1982, regarding the 1080 hearing and use of 1080 as a predacide.

October 31: The Pacific Legal Foundation (at the Denver Court, Tenth Circuit) appealed EPA Assistant Administrator Lee Thomas' decision on 1080 for the petitioners, National Cattlemen's Association, National Wool Growers' Association, and Public Lands Council.

Hogan and Hartson et al. at the Washington, D.C. Court filed an appeal for Defenders et al. of the 1080 decision by EPA Assistant Administrator Lee Thomas.

November 16: The Wyoming Department of Agriculture requested of the EPA a formal administrative hearing under FIFRA regarding the EPA Notice of Intent to Cancel Strychnine Rodenticides (RPAR).

November 18: The EPA approved the USDI-FWS applications for extension of the USFWS EUPs: one for use of 0.05 pound of 1080 in SLD baits to determine effectiveness in coyote control and impacts on nontarget species, and one for use of 0.6 pound of 1080 in "toxic collars" in Idaho, Montana, and Texas.

November 21: The EPA granted an EUP to the University of California at Davis for experimental trials of a "single lethal bait device."

November 29-30: A hearing by the EPA Scientific Advisory Panel on EPA Position Document 2/3 on the 1080 RPAR took place in Sacramento, California.

December: The final report was supplied to the USFWS by Texas A&M University on "Efficacy of the 1080 Toxic Collar as a Predator Damage Control Method," based upon TAMU research.

1984

January 11: The EPA issued a Federal Register notice of intent to conduct a formal administrative hearing on the strychnine RPAR issue under EPA Administrative Law Judge Marvin E. Jones.

February 23: The Tenth Circuit Court denied Defenders et al. motion to transfer the appeal of the Final Decision on 1080 as a predecide by the EPA to the Washington, D.C. Circuit Court.

April 4: EPA Administrative Law Judge Marvin E. Jones held a prehearing conference with parties to the strychnine RPAR hearing.

April 5: EPA Administrative Law Judge Marvin E. Jones formally announced that the strychnine RPAR hearing would begin on August 7, 1984, at Washington, D.C.

April 26: The memorandum from A.E. Conroy II, EPA Compliance Monitoring, to John A. Moore, EPA Assistant Administrator, regarding "Implementation of 1080 Final Decision" was issued.

May 23: An EPA notice was published in the Federal Register of "Issuance of an Experimental Use Permit; USDA Forest Service" for use of 0.0009 pound of 1080 in grain bait to evaluate control of black-tailed prairie dogs on a maximum of 75 acres in South Dakota.

May 29: Hogan & Hartson filed a brief with the Tenth Circuit Court in Denver regarding review of the 1080 Initial Decision by EPA-ALJ Nissen and the Final Decision by EPA Assistant Administrator Lee Thomas.

May 29: The Pacific Legal Foundation filed a brief for review by the Tenth Circuit Court (Denver Circuit) of the 1080 decisions by ALJ Nissen and EPA Assistant Administrator Lee Thomas.

June 14: EPA-ALJ Marvin E. Jones granted the EPA Motion for Continuance of the beginning of the strychnine RPAR hearing from August 7, 1984, to October 15, 1984, in Washington, D.C.

July 27: The EPA filed a brief with the Tenth Circuit Court regarding review of the 1080 decisions by ALJ Nissen and EPA Assistant Administrator Lee Thomas.

August 13: The U.S. Fish & Wildlife Service formally requested permission from the EPA to intervene in the strychnine RPAR hearing in support of continued registration of strychnine products for field rodent control.

August 16: The USFWS issued its biological opinion that survey methods for black-footed ferrets were adequate to verify their presence "to a level of probability that is adequately protective of this species."

September 12: EPA-ALJ Marvin E. Jones granted the motion, agreed to by all parties to the strychnine RPAR hearing, for continuance of the hearing to begin on April 15, 1985, with the location to be announced later.

December 27: Senator Steve Symms' (Idaho) staff completed research which indicated that "authority to conduct animal damage control currently resides in the USDA."

1985

January-December: Various offers and counter offers were made by the EPA and other parties to the strychnine RPAR hearing in regard to settling of this issue without a formal administrative hearing.

January 21: Oral arguments were made before the Tenth Circuit Court of Appeals at Denver, Colorado by PLF, Defenders et al. and EPA regarding review of the EPA decisions on 1080 as a predecide.

January 23: In a letter to President Reagan, Senator Steve Symms (Idaho) and 19 colleagues in the Senate urged relocation of the ADC program to USDA.

January 25: The USDI Fish and Wildlife Service requested reregistration by the North Dakota State Laboratory of strychnine egg baits for control of Franklin ground squirrel predation on wild duck nests.

February 4: USDI Secretary Clark responded to congressional inquiries that "...I have given much thought to ADC and have concluded that I personally support its transfer to Agriculture."

February 27: Senator Steve Symms (Idaho) and 19 colleagues urged USDI Secretary Donald Hodel to carry out "immediate action to bring about this long overdue transfer" (of ADC) to the USDA.

March 7: The EPA presented a motion, joined by all parties to the strychnine RPAR hearing, to continue initiation of the hearing from April 15 to July 17, 1985; the motion was granted by ALJ Marvin E. Jones.

March 8: The Wyoming Department of Agriculture requested an emergency exemption from the EPA to permit use of strychnine for control of a rabies outbreak in skunks, and the Montana Department of Livestock submitted a similar request.

March 26: USDA Secretary John Block and USDI Secretary Donald Hodel formally agreed to the transfer of ADC from USDI to USDA.

April 17: The USFWS applied to the EPA for an EUP (for 2 years) to permit use of 0.66 pound of 1080 in SLD baits to eradicate arctic foxes on Kiska Island, Alaska, to protect the "endangered Aleutian Canada goose."

May 14: The EPA issued a "Preliminary determination" to deny the Wyoming Department of Agriculture and Montana Department of Livestock requests for emergency use of strychnine for control of skunk rabies.

May 15: An EPA notice was published in the Federal Register of "Issuance of an Experimental Use Permit to the U.S. Department of the Interior" for use of a total of 0.033 pound of 1080 in SLD baits to evaluate these baits for control of coyotes and their impact on nontarget wildlife.

July 11: EPA-ALJ Marvin E. Jones granted a motion by all parties to continue the strychnine RPAR hearing from July 17, 1985, to November 5, 1985.

July 11: The EPA notified the USDI-FWS of its intent to approve the USFWS request for registration of Compound 1080 for use in Livestock Protection (LP) Collars (small collars only), effective July 18, 1985.

July 17: The EPA announced in the Federal Register its issuance to the USFWS of a conditional registration of Compound 1080 for use in small Livestock Protection Collars, effective on July 18, 1986.

July 23: The EPA issued comments to the Wyoming Department of Agriculture and Montana Department of Livestock regarding "data requirements to support registration of a strychnine egg and/or lard bait to control rabid skunks," which "requires a commitment to fulfilling these requirements prior to reopening the (strychnine) cancellation hearings."

July 31: The EPA issued a Federal Register notice of "Intent to Cancel Registration of Certain Pesticide Products Containing Sodium Fluoroacetate (1080); Availability of Position Document 4" in regard to 1080 rodenticide products.

August 20: USDA Deputy Secretary John R. Norton III provided a summary response to the OMB on certain details for USDA administration of the ADC program when it is transferred to the USDA.

September 19: The Tenth Circuit Court of Appeals issued its decision on the appeals of the EPA decision to permit registration of 1080 in the Livestock Protection Collar and in SLD baits if data provided were adequate. The Circuit Court decision upheld the EPA decision with two exceptions:

1. The Circuit Court ruled that the EPA could not prohibit "local government employees" in a state from use of single lethal dose baits if the baits are registered for use.
2. The EPA administrator exceeded his authority in ruling that all SLD applicators must be certified by a federal agency. "The administrator is without statutory authority to adopt a blanket rejection of all state plans for certification...." However, he may reject individual state plans if they do not provide adequate assurance of compliance with EPA requirements.

September: The EPA issued a "call in" for specific data on efficacy and safety for all 1080 rodenticide registrations.

October 31: EPA-ALJ Marvin E. Jones granted a motion by all parties to continue the strychnine RPAR hearing from November 5, 1985, to December 17, 1985.

November 6: The EPA granted Section 18 emergency exemptions for 1 year to the Wyoming Department of Agriculture and the Montana Department of Livestock for use of strychnine-treated eggs to control local rabies epizootics in striped skunks.

November 6: The EPA granted an Experimental Use Permit to the U.S. Fish & Wildlife Service authorizing the use of Compound 1080 to eradicate arctic foxes on Kiska Island, Alaska, to protect endangered Aleutian Canada geese.

December 12: EPA-ALJ Marvin E. Jones issued a memo to the hearing clerk that all parties to the Strychnine RPAR hearing should work toward settlement of this issue out of court and report to the court on a monthly basis on progress, beginning with the first report due on January 22, 1986.

December 19: An amendment to the continuing federal budget resolution was passed by the U.S. Senate and House of Representatives to transfer all USFWS-ADC positions, equipment and funding to the USDA-APHIS. The continuing budget resolution became final with signature by President Reagan at 6:10 pm E.S.T.

1986: January 22: The EPA issued notice in the Federal Register of its intent to approve the Wyoming Department of Agriculture's amended plan for training and certification of applicators of Compound 1080 in small Livestock Protection Collars. The notice provided for a 30-day public comment period which ended on February 22.

February 7: The EPA issued notices to the States of Wyoming and Montana which amended their Section 18 specific emergency exemptions for use of strychnine in egg baits to control rabies outbreaks in skunks. The amendments permit the states to use egg baits in all counties where rabies specimens are confirmed by laboratory diagnoses.

Dale A. Wade
February 24, 1986