

## MODERN ASPECTS OF PREDATOR CONTROL

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Abstract: Predator control is one of the many problems that must be considered in resource management. Animal damage control is really the proper term rather than predator control and applies to the protection of livestock from predators, and to the management of wild game populations to meet their forage and environmental requirements. The primary predator is the coyote. The coyote population and range has increased steadily over the years in spite of increased human population and control directed toward this species. The big problem in predator control is to bring the proper picture before the public in a way that it can be understood. There is a need for a systems approach to animal control and the refining of techniques for evaluating populations and their effect on the environment. Continued development of humane methods of controlling wildlife responsible for damage should have top priority. There is also much to be learned about rabies in wildlife - we are way behind in gathering this important information.

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The subject of animal control is very sensitive in industry, in the public, and in government. Sometimes strong feelings and emotions are involved, which are due primarily to the absence of valid information. First, we must professionally accept the fact that control or regulation of animal numbers is a necessary resource management practice. The important thing is to do this intelligently and judiciously with our present knowledge without upsetting ecological relationships.

Predator control is not just a reduction effort - rather it is a part of the wildlife management program effort to achieving a balance with resource needs. It is currently based on the premise that predators are a natural and essential part of many ecological relationships. There is some data about wildlife and livestock relationships, but operating philosophies are too often far apart. If we are to discharge the animal control efficiently and in a responsible manner it must be within the framework of the total or overall resource management program. If one is livestock oriented, there might be in some cases too little planning for wildlife and on the other hand the conservationist probably should give more consideration to working out compatible livestock-wildlife land use. It has been proven that wildlife and livestock can be compatible on many areas with proper management.

It must be recognized that resource management, not just predator control alone, must be redirected. Since July 1, 1965 much more attention and much more progress has been made in proper orientation of predator control than that accomplished in other phases of resource management. It is not necessary or appropriate to defend the past, but many decisions made in the decade just past and those before were, no doubt, with information at hand, appropriate at that time. It is not predator control any more as such, it is a matter of animal damage control and applies to almost all wild animals. The Bureau of Sport Fisheries and Wildlife's philosophy and policy of animal damage control is spelled out in the publication, "Man and Wildlife," appearing in May, 1967.

The policy is accepted, I am sure, by this audience and by all agencies with resource management responsibilities, by conservationists, and by livestock and agricultural interests. The primary problem, as I see it, is to get the people, regardless of their interests or affiliation, to accept the fact that this policy is being strictly and judiciously pursued with available budgets and personnel.

The Wildlife Society recently published a policy statement, very similar in concepts and philosophy to that adopted by the Department of the Interior. However, the Wildlife Society and other conservation agencies cannot stop with just the acceptance of the present policy, they must take positive action to determine how well the current operation is meeting the guidelines. I would suggest that the California - Nevada Section of the Wildlife Society appoint a three man committee to investigate the actual status of the program today.

The State Supervisor, Division of Wildlife Services, in California, as well as other states, will welcome you and will be eager to open the files and give you an 'inside look' at what the problems are and how they are being met. This could accomplish several things, among them: You will gather firsthand knowledge; you will be able to offer valuable suggestions; you will report your findings back to the local membership which will establish a direct pipeline of communications; and the expansion of this positive approach throughout the Nation will correct a most inaccurate impression of the Bureau's present role in animal control. Up to now and along the way I want to indicate that we need a meeting of minds and your support if we do the job you expect of us.

A splendid example of the value of this approach to bring existing circumstances relative to wildlife to a specific group was demonstrated several years ago, and each of us involved have never forgotten the experience.

In a certain desert recreation area the wild burro population had increased to a critical point. It would be necessary to reduce the herd to a number compatible to the range feed. The problem was that necessary measures could not be taken due to opposition of a group in Los Angeles County. Our agency, together with National Park Service; Bureau of Land Management; State Fish and Game; and California Department of Agriculture were able to get the president of the group to take a week of his time to observe the conditions. After covering the problem canyon area for five days by air and by 4-wheel drive vehicles he was able to

count several hundred burros in one large canyon where all the forage was gone except for a small cover of creosote brush. This organization had confidence in their president and when he reported the on ground inspection to the membership they immediately supported the proposed project. In most cases proper communications is the answer to most problems.

There has been a great deal of interest in anti-fertility agents such as the reproductive inhibitor Stilbestrol, which in the beginning, after considerable field testing, showed promise, but does not at this writing appear to be a practical field operations technique. It is wished to point out, however, that research in this direction is continuing.

There is a tremendous need for a systems approach to animal control and refining of techniques for evaluating populations and their effect on the environment. More accurate population estimates are possible today and more emphasis should be placed on improving census methods and statistical analysis. Continued development of humane methods of controlling wildlife responsible for damage or nuisance problems should have top priority. Decisions are many times very difficult. You may encounter an acute animal damage problem in the same geographical area in which you are confronted with the problem on an endangered species.

The following are field studies underway by the Division of Wildlife Services in California, most of which are cooperative projects with other agencies:

Wildlife Ecology and Population Survey. It became apparent that the Division of Wildlife Services, having the responsibility of animal control, must develop a wildlife ecology and population survey in each state. In California a survey of this type has been implemented this fiscal year. The results should indicate: (1) How animal damage control activities influence or effect the ecosystem, especially the predator and furbearing animals; (2) How efficient animal damage control operations are in controlling depredating animals; (3) the distribution and movement patterns of predatory animals and other wildlife species; (4) The predatory and other wildlife animal population levels by developing an index that can be used for annual or seasonal comparisons. Because of budgetary and manpower restrictions, this survey was integrated with regular animal damage control activities.

Description of Survey. The population and ecology survey has Statewide magnitude and has a coverage of 78,097 acres in order to be as statistically valid as possible. The acreage computation was based on a one percent sample of the 7,809,680 acres of private ranch and range land that were under animal damage control agreement or request during Fiscal Year 1969.

The survey area was computed on the basis of linear or road transects. The average ranch or trapline road is approximately 15 to 20 feet in width, (including berm) and the potential visitation span is about 45 to 60 feet on each side of the road when an animal control biologist is looking for animal scats. The large majority of the scats will be found in the road or on the berm. There is a great deal of variation in the span of vision since it is reduced by vegetation, terrain, etc., but the ability of wild animals to travel through such

obstacles is also reduced and sometimes eliminated. The animal control biologist has to sometimes walk from the survey vehicle along animal trails or animal crossings in order to observe the animal scats within the transect. Using the average vision span of 120 feet, road inclusive, one mile of road or linear transect will equal 15 acres. In order to have complete coverage of the 78,097 acres of sample area, a total of 5,206 miles of linear transect (120 feet wide) was surveyed.

The District Supervisors and the Field Assistants that they select to participate in the survey designated and mapped the road transects in their area. The transects were confined to those areas where the land status remains as stable as possible and to those areas that will yield the broadest possible population and ecological data. The animal damage control activities are somewhat stable in the areas selected for study. Both District Supervisor and the selected Field Assistant will collect the scat and population information twice each fiscal year, (Pre-breeding survey during October and November and post-breeding survey during May and June). Scat counts will be confined to the following species: coyote (Canis latrans), bobcat (Lynx rufus), gray fox (Urocyon cinereoargenteus), raccoon (Procyon lotor), skunk (Mephitis mephitis), bear (Ursus americana), cougar (Felis concolor) and San Joaquin kit fox (Vulpes velox) within their individual habitat ranges. Visual observations will be recorded on all the aforementioned species, plus as far as possible, hawks and eagles (Accipitridae), condors (Cyarnogyps californianus), ground squirrels (Citellus sp.), rabbits (Lepus sp.) and other mammals that may be of interest. A standard form is provided for data collection purposes. It will include weather, temperature and other factors that may influence the survey information.

University of California Coyote Ecology Study. In 1966 this Division began assisting the University of California with a proposed five year ecology study of the coyote in the Sagehen Creek Basin. The study area is located north of Truckee in the Sierra-Nevada Mountain range. This ecology study is conducted by Vernon M. Hawthorne, Research Biologist, and is under the direction of Dr. Starker Leopold.

During the last three years a total of 90 coyotes have been captured by traps or at den sites. All coyotes are weighed, measured, sexed, and their condition recorded before they are ear tagged, and released. Small metal collars and "Saflag" plastic markers have been used successfully to improve visual observations. Several precautions were taken to prevent foot damage from traps. Tranquilizer tabs attached to the trap jaw and rubber inner tubes attached to trap chains were ineffective. It was soon discovered that additional precautions were not entirely necessary when using the Oneida-Victor No. 3N trap (off-set jaw), and inspecting traps early each morning; however, as an added precaution, two layers of burlap were wrapped on each jaw. The range of the 21 coyotes that had tag returns or that had been recaptured, varied from being retrapped at the original trap site to a distance of 85 miles from the release site.

Division personnel provided the necessary field assistance in the techniques of trapping, animal behavior, coyote movement patterns, and other areas of orientation. Direct assistance was provided in den hunting operations, which accounted

for six dens, and 21 pups were tagged and released during the last three years.

A total of 131 coyote scats have been analyzed. The principal food items appear to be: Microtus sp. - 30%; deer - 17%; cattle (carrion) - 14%; marmot (Marmota sp.) 3%; rabbit (Lepus americana) - 2%; other rodents (5 species) 4%; and domestic sheep 1%.

Waterfowl Nesting Improvement Study. Modoc National Wildlife Refuge personnel have found mallard (Anas platyrhynchos) and goose (Branta canadensis) nest depredation to be as high as 85 percent on some of the refuge's primary nesting areas. Investigation showed the striped skunk is the primary species responsible, although some depredation is caused by raccoons. At the request and with the assistance of refuge personnel a trapping program was initiated, using live animal traps and shooting skunks at night. More than 160 skunks were removed and in the spring of 1969 the waterfowl hatch was increased by more than 80 percent in some areas.

Skunks reinvade the refuge nesting areas from adjoining private ranches each year. A surveillance program will be necessary to keep a current check on the density of the skunk population to determine the degree of control needed annually.

Management of Rare and Endangered Species. According to the Bureau of Sport Fisheries and Wildlife "Redbook", California has 12 species of rare and endangered animals. The three recent additions to the list are: The American peregrine falcon (Falco peregrinus); the light-footed clapper rail (Rallus longirostris); and the California least tern (Sterna albifrons). The two species of primary concern are the California condor and the San Joaquin kit fox. Our Bureau has assigned a full-time biologist to study the condor to determine how best to insure its survival. The California Department of Fish and Game direct and coordinate an annual condor survey, enrolling other Federal and State agencies. The Audubon Society, of course, assists and employs a full-time condor warden. The Division of Wildlife Services personnel participate in the annual condor survey. The survey is designed only to procure information that will establish an index or trend of the minimum condor population that remain in the South Central portion of the State.

The San Joaquin kit fox population appears to be somewhat stable within desirable habitat areas of Central and Southern California. However, thousands of acres of ideal kit fox habitat are being destroyed each year as water projects make irrigation and cultivation possible. It is anticipated that the trends in land development will someday begin to make drastic inroads into the San Joaquin kit fox population.

If ranchers leave an occasional island or knoll of brushland (approximately 40 acres), it has been found that under these conditions land development generally creates better feeding conditions for the remaining kit fox.

In conjunction with regular activities, Division personnel have conducted kit fox den surveys during the last five years over an approximate area of 420 square

miles in southern Kings, southwestern Tulare and northwestern Kern Counties. The results indicate a reasonably stable population of San Joaquin kit fox. This year a total of 112 active kit fox dens were reported in the survey area.

Wildlife Rabies Epidemiological Study. Harald N. Johnson, M. D., Director of Cooperative Arbovirus Studies, School of Public Health, University of California at Berkeley, is conducting an epidemiological study of rabies in the spotted skunk (Spilogale gracilis) and the weasel (Mustela frenata and Mustela erminea) under a grant from the Rockefeller Foundation. This is an effort to demonstrate that the rabies virus in spotted skunks and weasels is a latent infection. Rabies virus has been found in the lungs and kidneys, as well as in the salivary glands and brain of spotted skunks that die of rabies. The rabies virus obtained from the spotted skunk is unusual in that the disease produced by it in mice was characterized by a long incubation period and the cytoplasmic inclusion bodies were different from the negri bodies found in mice infected with the virus obtained from dogs. Dr. Johnson also noted that over a 30 year period less than ten percent of the cases of skunk rabies in California involved spotted skunks. The Division of Wildlife Services is assisting Dr. Johnson with his study by supplying the necessary spotted skunks.

Epidemiological Study of Hydatid Disease. The Division of Wildlife Services is participating in an epidemiological study of hydatid disease (Echinococcus infection). The study is being conducted by Dr. Calvin W. Schwabe, and Dr. Irwin Liu, Department of Epidemiology and Preventive Medicine, University of California at Davis. Man, sheep, and less often deer (Odocoileus sp.), cattle, horses, and swine are infected with this parasite that is known to be carried in the intestines of dogs. This study will determine the importance of the coyote in the transmission of this disease by laboratory examination of coyote intestines, taken from eight counties that have a high incidence of hydatid disease. Echinococcus granulosus, the parasite responsible for hydatid disease, has never been identified in the coyote in the United States, until this year. Hydatid disease is the number one human health problem in Cyprus, and is a major health problem in many other Mediterranean countries.

The number of sheep that die of this disease is not known, but the latest records indicate that five people have had hydatid disease in California. However, the actual intensity of infection in humans will not be known until the University completes their search of hospital records. Most of the people that have hydatid disease are sheep herders ••• people closely associated with the sheep industry. The latest recorded death was in 1969 when a Kern County sheepman died of this infection, and in 1965 two members of one family, who were in the sheep business, underwent surgery for the removal of Echinococcus cysts or hydatids from their lungs and livers. The parasitic infection was stopped in time, and both individuals survived.

More than 200 coyote intestines have been collected from counties that have a history of this disease. The nineteen District Field Assistants that were involved made the collections while conducting routine animal damage control activities. Of the total number of samples collected, 197 intestines have been

examined in the laboratory and tapeworms (Echinococcus granulosus) have been identified in seven of the specimens, (4% of number tested). All but one of the infested coyotes were taken in Tehama County, and the other in Mariposa County.

Beaver Control Program on the Upper Kern River and its Tributaries. The California Department of Fish and Game carried out a beaver (Castor canadensis) introduction program on National Forest lands within the Kern River drainage of Tulare County during the early 1940's. Over the years the progeny of the introduced beaver began invading the waters of the Upper Kern River in the Sequoia-Kings National Park. The ecology of the Upper Kern River has been changed a great deal since the beaver arrived and expanded their population beyond the food capacity of the habitat. There are now vast tangles of beaver cuttings and fallen cottonwood trees that create dams, diversions, and large stillwater pools. As the water level drops in late summer, these pools often become stagnant and foul-lain by a thick cover of tall grasses and bracken fern. These pools are not only preferred mosquito breeding areas, but they often inundate trails and meadows. The trails are rendered impassable by flooding or by the criss-crossed beaver-cut trees, and the meadows become too boggy for recreational and other uses. Beavers were well established, not only on the twenty-two miles of the Kern River inside the park, but are also prevalent in the Kern River more than fifty miles below the park boundary. Beaver populations were well established throughout the Golden Trout Creek drainage, including its confluence with the Kern River. California Department of Fish and Game, Fisheries Biologists, and U. S. Forest Service Biologists recommended that the beaver on the Golden Trout Creek drainage be removed as a management practice to enhance the native golden trout fishery. Golden trout cannot tolerate any appreciable amount of siltation of spawning beds.

Further Beaver Control Activities. On June 2, 1969 beaver control operations were initiated in the Sequoia-Kings National Park and the Sequoia-National Forest as a result of a \$6,500.00 contract with the Division of Wildlife Services. A total of \$5,000.00 was allotted for actual control expenditures and \$1,500.00 was reserved for helicopter costs to transport men and equipment. The target area was the 22 miles of Kern River that flowed through the Park and Sequoia National Forest. A total of two Animal Control Specialists were assigned to this task. Division of Wildlife Services horses were used for on ground transportation and the Park Service helicopter was used to transport the men and equipment into the control area on a ten day in and four out basis.

Control activities were extremely limited during the first few weeks in June, because of the abnormally high water. The high water rendered many areas of the Kern River Canyon impassable for several weeks, and therefore, most of the control included shooting beaver, reconnaissance and exploration of passable river areas.

An additional contract with the U. S. Forest Service, Inyo National Forest and the California Department of Fish and Game shifted beaver control operations to the Golden Trout Creek drainage on September 2. Here a U. S. Forest Service plane was used to transport men and equipment. A total of \$2,430.00 was set aside by the U. S. Forest Service and the Department of Fish and Game for this

beaver control operation. A total of 36 beaver were removed from the Golden Trout drainage between September 2 through October 10, 1969, all but four were taken in conibear traps. Of the total, 23 were taken in Golden Trout Creek, 10 were taken from Tunnel Meadow and three from Ramshaw Meadow. Of the 36 taken, 42% were adult males, 33% were adult females and 25% were kits or juveniles.

Division of Wildlife Services personnel estimated that approximately one-third of the Golden Trout Creek beaver population has been removed, however, natural reproduction will take place and reinvasion will occur without continued control of beaver on the Kern River.

Statewide Wild Burro Survey Study and Management Objective. This program is spearheaded by the Bureau of Land Management and is being conducted under a formal cooperative agreement by the California Department of Agriculture, California Department of Fish and Game, Bureau of Sport Fisheries and Wildlife and the Bureau of Land Management. The management objectives cover the different responsibilities that each agency will implement.

University of California Animal Tumor Study. We are at this writing in the stage of working out the degree of assistance we can furnish the University of California Department of Pathobiology laboratory in their study of diseases, especially cancer, that develops in wild and domestic animals, and plant populations. It is expected that the work will (1) add to the knowledge about cancer, (2) point out the type of animals or plants that could be used to study cancer, and (3) detect problems that might be related to human activities. We will contribute animal specimens for this study.

Rabies Control. We cannot overlook the growing threat of rabies in the world, here in the United States and right here in California. In the United States today, the rabies problem is one of resident wildlife species. Concern for public health and subsequent losses to livestock continue to grow in magnitude. As far as canine pets are concerned the problem has been or can be eliminated through good immunization programs. The position of the Medical Fraternity as expressed in the Merc Manual is that rabies usually becomes a problem when the wildlife vector population is high. Locally, it becomes self-limiting because it decimates susceptible vectors until the disease can no longer be propagated. Planned reduction in numbers will bring about the same result and local danger from the wildlife reservoir will be minimized. If conducted on an adequate scale, systematic reduction of the involved species population has been shown to be effective in preventing spread of rabies from foci of infection.

The responsibility of the Bureau of Sport Fisheries and Wildlife in rabies suppression programs is primarily one of providing technical assistance in reducing vector species. We must rely on the judgment of the medical and veterinary professions and follow their recommendations which are based on current information and experience.

However, when is population reduction justified? If so, when is the effort sufficient, and to what degree is it effective. We know how to humanely reduce

an animal population with the least damage to other non-target species. What must be known is when it is necessary and effective, and proper judgment cannot be made until we are fortified with factual data. I have taken the position for many years and I repeat here that the time is long past due for a combined broad, comprehensive, and intensified research study on the subject, "Rabies Versus Wild Animal Populations and Relation to Human Health." It is recommended that each agency involved select a representative to serve on a committee with this assigned objective and pool talents and monies in a coordinated total effort to answer many of the questions confronting us. This study will, of course, be broader than the suggested title indicates.

Solving Sea Gull Hazards at Airports. This problem became acute about 1963. Ronald Thompson, our biologist, introduced and demonstrated the use of taped recording of distress calls of the gulls (*Larinae*) to the North Island Naval Station. The technique was very successful and cleared the birds promptly from the complete airport area. Trucks especially equipped with an amplification system are in use at several airports that have a seagull problem.

Nutria. A continuous cooperative detection program with respect to nutria (*Myocastor coypus*) is maintained by the Bureau of Sport Fisheries and Wildlife, Division of Wildlife Services, California Department of Agriculture, and the County Departments of Agriculture. The problem with this animal in the South and Southeastern states is one of great magnitude, compared to some extent with the rabbit problem in Australia.

Bovine Tuberculosis in Wild Swine in San Luis Obispo County. This disease is communicable to humans. Fortunately, the infection is confined to the Hearst Ranch (located in San Luis Obispo county, California) which, however, covers 86,000 acres. A total of 567 feral swine (*Sus scrofa*) were removed in a two year period, all were tested and 11% were found to have positive tuberculous lesions.

California Rabies and Wildlife Control Council. In 1963 the County Supervisors Association of California and this Division recognized the need of an organization representing the various agencies and problems connected with rabies and wildlife. They took steps to arrange a meeting with representatives from interested organizations. Before the meeting adjourned those in attendance voted unanimously to establish a Statewide Citizens Council on rabies and wildlife. The council was officially named the "California Rabies and Wildlife Council" in 1967. The ten voting members represent the following organizations:

- California Association of Agricultural Commissioners
- California Conference of Local Officers
- California Cattlemens Association
- California Woolgrowers Association
- California Farm Bureau Federation
- California State Chamber of Commerce
- California Wildlife Federation
- State Humane Association of California

County Supervisors Association of California  
California Fish and Game Commission

This Council covers the broadest possible economic and public representation in California. Its membership reaches many more people than do most departmental advisory councils. The primary objective of the "California Rabies and Wildlife Council," as stated in the by-laws, "Shall be to bring about greater unity of purpose, policy, and program among the various organizations and agencies directly or indirectly interested in rabies and wildlife by serving as a control clearing house of information, ideas and suggestions for improvements in rabies control and wildlife management."

This council is functioning, and each member has a keen interest in the natural resources and wildlife. The last meeting was held January 7, 1970 in Sacramento. To me this is the proper way to communicate and establish unanimity.