March 1992

CONTROL METHODS RESEARCH PRIORITIES FOR ANIMAL DAMAGE CONTROL

C. Joe Packham
USDA/APHIS, Animal Damage Control

Guy Connolly
USDA/APHIS, Animal Damage Control, Denver Wildlife Research Center

CONTROL METHODS RESEARCH PRIORITIES FOR ANIMAL DAMAGE CONTROL

C. JOE PACKHAM, USDA/APHIS, Animal Damage Control, Pocatello Supply Depot, 238 East Dillon St., Pocatello, Idaho 83201

GUY CONNOLLY, USDA/APHIS, Animal Damage Control, Denver Wildlife Research Center, P.O. Box 25266, Denver, Colorado 80225

ABSTRACT: A national survey of Animal Damage Control (ADC) method research needs was conducted in 1990. ADC program State Directors provided responses for each state. Individual state data was aggregated into a national ranking list of ADC program priorities for directing future wildlife damage control methods research. Species groups ranking highest, nationally, included: blackbird/starling, waterfowl, coyote/fox/dog, wading bird/cormorant and ungulate groups. Species groups ranking lowest, nationally, included: swallow, crane, rabbit, porcupine, and hog groups.

INTRODUCTION

In 1989 the Animal Damage Control (ADC) program initiated a systematic review of wildlife damage control research and development needs. The objective was to have a system in place by October 1991 for establishing, supporting, and implementing research and development priorities that will ensure the availability of a fully adequate range of effective and socially defensible methods (ADC 1989). This paper reports the first of several steps being taken toward accomplishment of this objective. Establishment of national priorities for research on wildlife damage control methods is critical because of high demand for assistance, newly developing problems, long neglect of research for some problems, decreasing societal acceptance of some older control methods, increasing complexity of control method application, extreme competition for very limited funds, and the long time (10-15 years) required to develop new methods and bring them into use.

A working group of personnel from the ADC program, appointed by the ADC Deputy Administrator, determined that establishment of national priorities should begin by identifying and evaluating the universe of animal damage "problems" that confront ADC personnel at the local level. A problem was defined as an animal species damaging a resource. The next step was to evaluate and rank the effectiveness of the control methods related to these specific problems. Finally, national priorities could then be developed by aggregating these local problems and related method rankings.

ADC State Directors were selected as the basic source of information for developing a national ranking. They have a broad awareness of current wildlife damage problems and related control methods because they are a focal point for request for assistance and a wide array of wildlife damage related activities within their state(s). This paper reports the results of a national survey of ADC method research needs as perceived by ADC state personnel in 1990.

PROCEDURES
Questionnaire

A standardized questionnaire, developed by the research priority working group, was distributed to ADC State Directors for their use in recording current perceptions of animal damage control methods research needs in a format that would facilitate compilation into a national statement of priorities. Each state director was asked to evaluate all wildlife inflicted damage problems in the state(s) under their supervision. The questionnaire (available from the authors) established evaluation criteria and identified the array of damage problems to be evaluated.

Criteria

Seven criteria were identified as most relevant to damage control development needs:

1. Problem Level—the relative magnitude or seriousness of a damage problem at the present time;
2. Resource Level and Trend—starting with current production levels, a projection of expected trends over the next 5 years;
3. Species Level and Trend—starting from current population levels, a projection of expected trends for the next 5 years;
4. Method Group Effectiveness—a subjective evaluation of the effectiveness and practicality of methods currently available to cope with a specific problem;
5. Method Availability/Usability—a subjective evaluation of continued availability/usability of existing methods based on sources of supply, social accept ability, environmental acceptability, economics, legal restrictions and any other impacting factors;
6. Technical Involvement—a consideration of the current amount of ADC technical assistance involvement with the specific problem;
7. Operational Involvement—a consideration of current ADC operational (direct control) involvement with, or responsibility for managing this specific problem.

Identification of Species Groups

Selection of the species groups to include in this evaluation began with the most detailed lists available. It was considered important to evaluate every animal species known to cause significant damage in the United States. However, it was recognized that the practical universe of options could be addressed without evaluating every species separately because most control methods have application to many species. Therefore, the species were pooled into species groups

Table 1. Animal species and species groups established for prioritization of ADC methods research needs.

Birds	Mammals	Reptiles
albatross	armadillo	alligator
anhinga	badger	snake
blackbird	bat	turtle
bulbul	bear	
cedar waxwing	beaver	
cormorant	bobcat	
crane/ibis	cat (domestic)	
crow/raven	coyote	
dove	dog (domestic)	
eagle	fox	
exotic bird	hog (feral)	
grebe	marmot	
grosbeak	mink/otter	
gull	mountain lion	
kingfisher	mole	
lark	mouse	
magpie	muskrat/nutria	
mockingbird	opossum	
pelican	pocket gopher	
pheasant	porcupine	
pigeon	prairie dog	
quail	rabbit/hare	
raptor	raccoon	
robin	rat	
sparrow/finch	ringtail	
starling	skunk	
swallow	squirrel (ground)	
vulture	squirrel (tree)	
wading bird	ungulate	
waterfowl	vole	
woodpecker	weasel	
	wolf	

Table 2. National ranking of ADC method research needs for resource groups based on scores given by all ADC State Directors. The number of states having a significant problem with a given resource/group is also shown.

Rank	Resource Group	Score	No. States
1	grain	6.9	41
2	nuisance	6.6	37
3	livestock	5.6	34
4	structure	5.1	30
5	aircraft	4.8	27
6	fish	4.5	25
7	forestry	4.3	27
8	fruit-berry	4.1	24
9	forage crop	3.6	22
10	truck-garden crop	3.4	21
11	golf course	3.1	17
12	disease	3.1	18
13	landscaping	3.0	17
14	pasture-range	3.0	19
15	road	2.8	18
16	nut-bean-seed	2.5	15
17	wildlife	2.4	15
18	dike-ditch	2.3	13
19	water quality	2.0	11
20	safety	2.0	12
21	apiary	1.7	13
22	shellfish	1.5	8
23	utility	1.5	8
24	fishery	1.1	7
25	equipment	1.0	6
26	plant	0.3	2
27	sugar	0.2	1

and the list was made as short as possible, but consistent with the goal of considering all forms of vertebrate animals that cause significant amounts of damage. The final list consisted of 66 species groups (Table 1).

Identification of Resource Groups

Selection of resource groups for this survey began with a comprehensive review of all resources known to be damaged by animals. As with animal species, it was not feasible or necessary to evaluate separately every resource that might possibly be damaged. It was recognized, for example, that methods for livestock predators would be similar for all classes of livestock. Therefore, sheep, cattle, hogs, poultry, etc. were pooled into a more generic resource category—"livestock." The final list included 26 resource groups (Table 2).

Data Collection

The seven criteria became the standards against which each state director evaluated damage problems, control methods and methods development needs. State directors were asked: (1) to identify each species group causing a problem with a particular resource group; (2) to rate the relative severity of each problem (Problem Level; Criterion 1) on a scale of 1 to 9; and (3) for each problem with a "Problem Level" rating of 6 or higher, to complete a more detailed appraisal by ranking the other 6 criteria using a scale of 1 to 9 for each one. The 1-9 rating scale was so designed that the highest rating indicated the greatest need for methods development research.

Data Evaluation

Research need raw scores from each State Director's questionnaire responses were computerized. A methods research priority list was developed for each state (available from authors) based on average scores calculated for each

problem using "Decision Pad" software (Apian Software, 1990).

The previously calculated average scores for each problem were then entered into "Quattro Pro" spreadsheets (Borland International Inc., 1991). The geographical distribution and the number of states in which each problem occurred were determined. In addition, average research need scores were calculated for each species group and each resource group within each state.

National wildlife damage control methods research needs rankings were then determined by processing the average research need scores calculated by Quattro Pro in two separate files in Decision Pad—one for species groups and one for resource groups.

RESULTS

Our consolidation and ranking of problems by species groups identified 32 out of the original 66 species groups as most urgently in need of control methods research (Table 3). Some of the original 66 species groups were assimilated into these 32 priority species groups.

Table 3 indicates average scores as well as the number of states in which each species group was ranked as a problem. Each score is the average of individual state scores from all states in which the species group was ranked as a problem. Table 3 includes all species groups that were ranked as a problem in 3 or more states.

National priority rankings were directly related to the number of states in which each species group was listed as a problem with two exceptions: gulls and raccoons. The number 1 ranked species group (blackbird/starling) was listed as a problem in 41 states, whereas numbers 30-32 (rabbit, porcupine, and hog) were each listed in only 3 states.

Our ranking of problems by resource groups incorporated all 26 of the consolidated groups (Table 2). We have included this information because it is of general interest. However, we have limited discussion in this area because most control method use and hence related research is determined by the target species rather than the resource being protected.

DISCUSSION

There is a clear distinction between the ranking of the top ten species groups and the bottom ten; but, there are no major differences between adjacently ranked species groups. This suggests that the sensitivity of the system allows one to say that methods research is far more critical for the blackbird/starling group, the highest ranked bird group, than for the swallow group, the lowest ranked bird group; but not necessarily more critical than for the waterfowl group or the coyote/fox/dog group, the second and third ranked groups respectively.

While duplicate calculations were done on resource groups, we have limited discussion on that information because most control method use, and hence research, is determined by the target species rather than the resource being protected.

The methods needs assessment described in this paper did not attempt to describe evaluations of specific control methods or attempt to identify which methods deserve priority in research. This question will be considered in a subsequent evaluation aimed at selecting the most promising

Table 3. National ranking of animal species groups by ADC State Directors' priority scores for control methods research needs. (Includes only species groups scored as a serious problem in 3 or more states).

Rank	Species Group	Score	No. States
1	blackbird/starling	6.9	41
2	waterfowl	6.3	35
3	coyote/fox/dog	5.3	32
4	wading bird/cormorant	4.8	27
5	ungulate	4.3	26
6	gull	4.2	23
7	beaver	4.0	26
8	pigeon	3.8	23
9	woodpecker	3.3	19
10	crow/raven	2.7	17
11	bear	2.4	17
12	skunk	2.3	14
13	raccoon	2.3	15
14	vole	2.2	14
15	prairie dog/ ground squirrel	2.1	12
16	marmot	1.9	12
17	robin	1.6	9
18	sparrow/finch	1.5	9
19	mountain lion	1.4	8
20	tree squirrel	1.3	8
21	pocket gopher	1.2	8
22	bat	1.1	7
23	rat	1.1	7
24	raptor	1.0	6
25	vulture	0.9	5
26	muskrat/nutria	0.7	4
27	mole	0.7	4
28	swallow	0.7	4
29	crane	0.7	4
30	rabbit	0.5	3
31	porcupine	0.4	3
32	hog	0.4	3

research options for specific methods applicable to each problem. Methods with potential application to many problems will receive priority over methods with relatively limited potential.

Table 4 shows a consolidated view of the method research need relationships between ADC problems: species groups vs resource groups. Each "X" represents a problem. The National priority problems are represented in the upper-left portion of the table. Those problems identified in the lower-right portion of the table are more likely to be critical in a regional or local area.

These ranked lists of species groups and resource groups

Table 4. Distribution of National ADC method research needs by problem (species group and resource group).

Species/Group	1 grain	2 nuisance	3 livestock	4 structure	5 aircraft	6 fish	7 forestry	8 fruit/berry	9 forage crop	10 truck/garden	11 golf course	12 disease	13 landscaping	14 pasture/range	15 road	16 nut/bean/seed	17 wildlife	18 dike/ditch	19 water quality	20 safety	21 apiary	22 shellfish	23 utility	24 fishery	25 equipment	26 plant	27 sugar
1 blackbird/starling	x	x	x	x	x			x	x	x		x				x	x			x			x		x		
2 waterfowl	x	x		x	x			x	x	x	x	x	x	x		x			x	x	x						
3 coyote/fox/dog		x	x		x					x		x					x			x							
4 wading bird/cormorant		x		x	x	x						x										x		x			
5 ungulate	x	x			x		x	x	x	x			x	x		x	x			x							
6 gull		x		x	x	x		x				x					x		x	x	x	x	x	x	x		
7 beaver	x	x					x	x	x	x			x	x	x	x	x	x	x				x			x	
8 pigeon		x	x	x	x							x								x			x		x		
9 woodpecker		x		x																			x				
10 crow/raven	x	x	x		x			x	x							x	x						x				
11 bear	x	x	x				x	x	x											x	x						
12 skunk		x		x								x					x										
13 raccoon	x	x	x	x				x	x	x		x					x										
14 vole	x						x	x	x	x	x		x														
15 prairie dog/ground sqrl	x								x	x	x		x	x		x											
16 marmot	x	x		x					x	x				x		x		x		x					x	x	
17 robin								x				x															
18 sparrow/finch	x	x	x	x	x			x				x								x			x		x		
19 mountain lion			x														x			x							
20 tree squirrel		x		x			x						x			x							x		x		
21 pocket gopher	x					x			x	x			x	x													
22 bat		x	x								x																
23 rat	x		x	x										x								x					x
24 raptor			x	x	x																						
25 vulture		x	x	x	x																		x		x		
26 muskrat/nutria	x								x									x									
27 mole	x	x									x		x	x													
28 swallow				x	x																						
29 crane	x								x					x													
30 rabbit								x	x	x				x													
31 porcupine				x			x	x							x												
32 hog			x							x		x															x

will be used as the basis for future direction of USDA-APHIS Animal Damage Control methods research. Appropriated funds will first be applied to Congressionally directed projects and then to the higher priority problems on a national basis. They will provide direction for program encouragement of methods research by units other man DWRC, i.e. other governmental agencies, universities and private companies. Research on lower priority problems not covered by appropriated funds will be encouraged by entities located within the states where the problems and interest exist.

At the beginning of this paper we indicated that several additional steps were necessary to accomplish the objective of realigning ADC methods research with program needs. Planned additional steps include:

1. Generate new research ideas (tools, methods, approaches, etc.) through a brainstorming symposium focused on the priorities described in this report. (Planned for April 1992.)
2. Develop a process for continuous search for and identification of new ideas.
3. Develop feasibility information (cost, expertise, labor, time, etc.) for the new research ideas.
4. Assign research priorities to new research ideas based on the feasibility information.

5. Analyze in-house and other research capabilities to match capabilities with project requirements. Assign or contract for the research.
6. Develop a research monitoring process and annually evaluate progress. Redirect research assignments and funds as necessary.
7. Review and revise research priorities ever 4 years.

ACKNOWLEDGMENTS

LITERATURE CITED

ADC APHIS, USDA, October 1989, Animal Damage Control Strategic Plan. dept. Agric. Plan. 19 pp.

ADC WORKING GROUP FOR METHODS RESEARCH NEEDS, February 1991, A Progress Report on Establishment of Priorities for ADC Methods Research. Dept. Agric. Rep. 39 pp.