November 1979

ATTITUDES OF CANADIANS TOWARD THE CONTROL OF RED-WINGED BLACKBIRDS

Robert G. Clark
Macdonald Campus of McGill University, Ste-Anne-de-Bellevue, Quebec

Rodger D. Titman
Macdonald Campus of McGill University, Ste-Anne-de-Bellevue, Quebec

J. Roger Bider
Macdonald Campus of McGill University, Ste-Anne-de-Bellevue, Quebec

ATTITUDES OF CANADIANS TOWARD THE CONTROL OF RED-WINGED BLACKBIRDS

Robert G. Clark, Rodger D. Titman
and J. Roger Bider
Department of Renewable Resources
Macdonald Campus of McGill University
Ste-Anne-de-Bellevue, Quebec

INTRODUCTION

Each year across Canada, millions of dollars of damage to agricultural crops can be attributed to vertebrate pests. Estimates for 1975 indicated that approximately $240,000,000 damage was incurred by agricultural pests (Solman et al. 1975). Worldwide impact of these pests must certainly be staggering, especially during the current trend of rising production costs and demand for food.

In Canada and the United States, pest control programs may be attacked by increasingly active and vocal environmental groups. Recently, the killing of blackbirds *(Icteridae)* and starlings *(Sturnus vulgaris)* in Kentucky and Tennessee evoked strong objection (Graham 1976, 1978; Jackson 1976). As a result, politically sensitive civil servants may feel justified in avoiding programs which involve the killing of vertebrate pests. While decision-making within the government is subject to public scrutiny and criticism, prior knowledge of public attitudes toward potential policies may enable public servants to make acceptable decisions regarding wildlife management (Hendee and Potter 1973)

Unfortunately, there is a paucity of sociological research addressing the question of public attitudes toward pest control. Arthur et al. (1977) assessed the attitudes of Americans toward the conflict between environmentalists and livestock ranchers regarding the killing of coyotes (*Canis latrans*), and Buys (1975) examined the attitudes of New Mexico ranchers toward coyotes and coyote control. From these studies it was found that ranchers harbor attitudes which are resistant to the implementation of non-lethal control techniques, and that, in general, the public was more concerned about the humaneness and species specificity of control than cost effectiveness. These facts are particularly relevant to the controversy concerning red-winged blackbird (*Agelaius phaeniceus*) damage to corn *(Zea mays)* in southwestern Quebec, where members of the agricultural communities have encouraged the use of lethal control measures to decrease blackbird populations (Weatherhead et al. these proceedings).

The objectives of this paper are to examine and assess the attitudes of Canadians vis-a-vis agricultural pest control and to include Quebec farmers' evaulations of the blackbird population, crop damage and control techniques. To achieve these objectives, the results from 3 surveys conducted during the period 1975-1978 were examined. The first was a study of the attitudes of Quebeckers toward environmentally-related outdoor activities and agricultural pest control (Clark 1979). Next, a survey of Quebec farmers was used to locate roosts, obtain crop-damage estimates and assess attitudes toward blackbirds and their control. And third, a random survey of Canadians examined attitudes toward the control of red-winged blackbirds which damage crops and suggested several management strategies.

MATERIALS AND METHODS

A questionnaire was employed in each of the 3 surveys. The first survey (Survey I) was conducted during the summer of 1975 in Quebec, Survey II was completed in 1976 and the Canadian study (Survey III) was conducted during 1978.

Survey I

This survey consisted of 71 questions. Respondents were asked to indicate their reaction to a list of 46 diverse outdoor activities on a 6-dimensional Likert scale ranging from "very much for" (1) through "violently opposed to" (6). The remaining questions gathered pertinent demographic information. Respondents spoke English or French and had the choice of responding in either language.

The survey was administered at six locations: two rural and four urban. A booth was constructed at each site, and a nature-related audio-visual display was incorporated. Respondents had the chance to win $20.00 or volumes 3 and 4 of Nature Canada. Due to the enticements used to encourage participation, the sample was biased toward people interested in nature and the outdoors. An elaboration of the questionnaire design, sampling, and biases was presented by Clark (1979).

Frequency distribution tables and means were computed for each of the 46 activities. The means were ranked from the most preferred activity (rank 1) to the least preferred (46) for the entire sample (overall) and by survey location, sex, language spoken, and place of residence (sub-samples). The degree of polarization within the sub-samples was determined for all activities by summing the occurrences of the most positive (lowest mean value) and negative (highest mean value) opinion. Survey location values were derived independently from the other sub-samples.

Responses to the activities were factor analyzed and rotated orthogonally to locate patterns of common variation among the variables (activities) (Rummel 1967). The factor accounting for the most variation in the data was assigned a name on the basis of large and independent factor loadings associated with the activities. The activities comprising this factor dimension were incorporated into a summated scale. The scale response was recoded into discrete categories and Chi-square tests were employed to assess the degree of association between the response and demographic variable categories. Details concerning these and additional analyses were discussed by Clark (1979).

Survey II

The questionnaire was partitioned into the following five groups of questions: 1) crops grown and damage to crops, 2) methods of damage control used and assessment of their effectiveness, 3) roost locations and sizes, 4) crop damage attributable to animals other than blackbirds, and 5) a general section related to blackbird populations and their control. Responses concerning blackbird population sizes and crop-damage levels were estimates provided by the respondent.

The survey was sent to farmers throughout Quebec along with a monthly newsletter from the Ministere d'Agriculture du Quebec. No stamped, return-addressed envelope was provided, nor were follow-up steps undertaken. Thus, farmers who replied were most frequently those who sustained blackbird damage to crops or who were at least interested in the problem.

Responses were used to construct frequency distributions for each variable. The average loss to blackbirds was computed in percent or in dollars, depending on the type of estimate recorded. Cross-tabulation tables were produced to compare farmers' perceptions of the severity of blackbird damage to crops and the status of blackbird populations with their level of endorsement of lethal control.

Survey III

This Canada-wide survey was designed to gauge opinion and attitudes toward the control of red-winged blackbirds which damage agricultural crops. Several series of questions were employed to assess public reaction to various alternatives for control, as well as toward other subjects such as marketing blackbird meat and compensation to farmers for crop damage. The sample consisted of three groups of Canadians: 1)112 Quebec farmers who had reported severe crop damage, and who had endorsed lethal control of blackbirds in Survey II; 2)104 executives of conservation organizations listed in the Canadian Conservation Directory 1978-79 (organizations were selected on the basis of their name and/or objectives, only groups indicating strong conservationist tendencies being chosen); and 3) 2169 Canadians. The third sample was generated by randomly selecting names and addresses from telephone directories. In each province, the largest urban center was sampled. Ten rural areas in each province were selected by placing a numbered dot grid on a map of the province, drawing a number from a random numbers table and recording the town nearest the point corresponding to the random number. Approximately twice as many names were chosen from the urban centers due to an expected imbalance in the response rate, i.e. a higher rate from concerned rural residents.

The questionnaire consisted of both open and closed-ended questions used to measure and explain opinion. Closed-ended questions were based on a 7-point Likert scale ranging from "very strongly support" (1) through "violently opposed to" (7) and included a "neutral" (4) category. Two series of questions were incorporated to obtain demographic and socio-economic information. The survey design was manipulated to provide the criteria necessary to maximize the response rate (Dillman et al. 1974). The follow-up consisted of three phases: 1) a post card was mailed five days after the Initial

mailing to remind people to complete and return the survey; 2) a replacement survey and covering letter were mailed 60 days following the first mailing to 1100 randomly selected non-respondents; and 3) 100 non-respondents were randomly selected and contacted by telephone. Phases 2 and 3 above were not conducted for the Quebec farmers nor the conservation organization executives. Phase 2 followed the initial mailing by 60 days due to a postal strike which caused a 30-day delay. A postage-paid, return-addressed envelope was enclosed with the survey throughout.

The mean response to each control method was calculated along with frequency distribution tables for all variables. Control methods were ordered in descending preference (low to high mean value) for the general public and compared with the Quebec farmers and conservationists. Responses to the methods of control by the general public (hereafter referred to as the G.P.) were factor analyzed to distinguish groups of inter-related control alternatives according to the methods described above (Survey I; Rummel 1967). Each factor was assigned a name on the basis of those control methods having high or independent factor loadings, and the responses to the methods were used to construct summated scales corresponding to each factor. The scales were recoded into three categories of response, and Chi-square goodness of fit was used to locate differences in response between the G.P., Quebec farmers (Q.F.), and conservation executives (C.E.).

RESULTS

Survey I

A total of 1244 responses was obtained. The means and ranks calculated for the overall sample and for sex, language spoken, place of residence, and survey location revealed that, as expected, aesthetically-pleasing activities ranked much higher (were preferred) than those which involved the killing of animals. In general, people were not Interested in killing animals that damage farm crops, removing pigeons (*Columba livia*) from the city, hunting small game, hunting blackbirds in agricultural areas, nor any other hunting activity. A notable exception to this was the response from the two rural survey locations in which people indicated Interest in blackbird control and hunting. These respondents also expressed some interest in shooting woodchucks (*Marmota monax*) in pastures, gassing trapped blackbirds found feeding in cornfields, and trapping beaver (*Castor canadensis*), all of which were considered very unpopular by others. Since many of the respondents at these locations were French-speaking males from the country, it was speculated that they were local farmers who had had experience with bird damage to crops. Among the activities considered uninteresting or unpopular, such as those listed above, the degree of polarization revealed that females from urban centers exhibited the most negative opinions. However, one important finding was that controlling predators, killing animals that damage farm crops and hunting blackbirds in agricultural areas, were viewed as favorably as hunting small game and ranked higher in preference than many hunting and trapping activities currently practiced.

Factor analysis resulted in the creation of 10 factor dimensions accounting for 59% of the variance in the data. The first factor, which explained 46.5% of the within factors variance, was called agricultural pest control and comprised activities related to the hunting and/or killing of various birds and mammals which have been linked with crop depredations (Table 1). The activities were incorporated into a summated scale called the agricultural pest control index (hereafter referred to as the A.P.C.I.). The distribution of the A.P.C.I. was significantly, negatively skewed (t-test, $p<.0.05$), indicating that, overall, respondents opposed the activities comprising the scale. The scale was recoded Into five categories (for, interested in, not interested in, opposed, and violently opposed to) (Figure 1) and X^2 tests were performed ($\alpha=0.05$). Survey location, place of residence, place of schooling, sex, language spoken, and membership in conservation organizations explained major variations in the response to the A.P.C.I. However, differences in response between survey locations resulted in the largest x^2 value (192.4, 20 d.f.).

Survey II

Altogether, 1236 questionnaires were returned from 69 counties. The Union des producteurs agricoles du Quebec had a membership of 38,000 farmers in 1974; therefore, this total represented approximately 3% of Quebec farmers.

Oats was the most frequently grown crop (403 farmers, 32.6% of all the farmers reporting). Silage corn (24.3%) and grain corn (12.9%) were second and third, respecttively. On the basis of hectares per farmer, grain corn was the largest (19.7), and silage was second (12.2). Sweet corn averged 9.5 ha. per farmer and was grown both extensively (290 ha.) and on a much smaller scale (68% of farmers growing sweet corn had

less than 4 ha.). Wheat, barley, and oats were generally cultivated on a very low hectare per farm basis.

From the values of crop damage provided from farmers reporting damage, the estimates of percent damage to both grain corn (125 farmers reporting) and silage corn (221 farmers) averaged 16, while mean damage to sweet corn (89 farmers) was 25. Average dollar losses of grain, silage, and sweet corn were $1295.00 (27 farmers), $550.00 (44 farmers) and $422.00 (29 farmers), respectively. In each case, means were derived from dispersed distributions of values which Indicated highly variable levels of damage. Crop losses of the remaining small grains were also variable but were generally less severe.

Overall, 1088 farmers gauged the severity of damage by blackbirds on a 3-point scale ranging from light (1) through moderate (2) to severe (3). Thus, 88% of all farmers (1236) reported damage to crops by blackbirds of which 33% was perceived as light damage, 41% was moderate, and 26% was severe. From 1032 farmers reporting, more than half (55%) felt that crop damage by blackbirds was increasing, 38% thought it was decreasing and 7% felt it was stable. Furthermore, when farmers were asked when blackbird damage began, nearly 60% of 814 respondents thought that the problem commenced between 1970 and 1975. An additional 30% felt that damage began during the 1960's.

Farmers used 13 methods to prevent or reduce blackbird damage: shotgun patrol, scarecrow, carbide gun, acetylene gun, firecrackers, AV-Alarm, avitrol, poison bait, biosonics, and protective netting (Table 2). Shotguns, exploder guns (carbide and acetylene), and scarecrows were used most frequently; whereas chemical repellents (avitrol, methiocarb), AV-Alarms, and firecrackers were seldom employed. In 1976, 579 (47%) of the respondents used some form(s) of control, yet none was evaluated as effective by all of the farmers (Table 2). Although shotgun patrolling was by far the most common control method, only 15% rated it as good to very good, and 41% rated it useless. The major disadvantage was the high cost in terms of shells and labor. Exploder guns were used in 18% of all cases and were found satisfactory by 26% of those farmers. Other control measures were not widely used nor highly rated, and very few farmers combined two or more techniques to protect their crops.

Nine percent of 964 farmers were opposed to the creation of a program to kill blackbirds which damage crops, Most of these respondents indicated that birds should be scared or chased to areas where little or no damage would result. In contrast, 52% of the farmers endorsed localized control and 39°/o favored Quebec-wide control. There was a significant relationship between perceived Intensity of damage, as reflected by blackbird population changes (increasing, decreasing, staying the same), and endorsement of lethal control; this relationship also existed between the perceived severity of damage and endorsement of lethal control (x^2, 4 d.f., $p<.0.05$, In both cases). Thus, farmers who indicated that blackbird populations were increasing, or who sustained severe damage, tended to favor Quebec-wide control; those who felt populations were declining or who had received light damage generally disapproved of widespread killing (Figure 2).

It is worthwhile noting that several species of birds and mammals were considered agricultural pests. Groundhog damage was reported most often and resulted from damage to draining systems causing floods, or from digging burrows which caused livestock injuries and machinery breakdown, Raccoons (*Proc yon lotor*) were implicated frequently in corn damage and predation on poultry. Other nuisance animals were porcupines *(Erethizon dorsatum)* (damaging trees In plantations and nurseries), wolves (*Can/s lupus*) and coyotes (killing livestock), and starlings (crop damage); however a great deal of uncertainty arose when respondents attempted to distinguish between starlings and blackbirds.

Survey III

The usable response rate for each sample was 24% general public (G.P.), 71% Quebec farmers (QF.), and 71% conservation executives (CE.). In addltion, 23 members (6.6% of the membership) of the Club des Ornithologues du Quebec (C.O.Q.) returned questionnaires which had been xeroxed from the original and distributed by the C.O.Q. executive, Thus, a grand total of 653 completed surveys was received: 476 from the G.P., 80 from the Q.F., 74 from the CE., and 23 from the C.O.Q. members.

In the third phase of the follow-up, 207 telephone calls were required to contact 100 non-respondents. Of these people, only 28 agreed to complete the survey while 72 in dicated that they either were not interested in the problem or did not possess sufficient knowledge to respond properly.

The mean and standard deviation for each control method was calculated by sample, and the methods were ordered according to the means of the GP. from the most prefer-

red (low mean value) to the least preferred (high mean Value) (Table 3). The use of scar ing devices and changing agricultural practices was widely accepted among the G.P. and C.E., whereas the Q.F. favored lethal control methods more and agricultural change less. Respondents were polarized on questions concerning the marketing and exploration of redwings for human consumption, requiring farmers to buy crop insurance, hunting redwings in agricultural areas, processing redwings for fertilizers or livestock feed, and compensating farmers for crop losses.

Factor analysis of the attitudinal response toward 18 control methods revealed four factors, or dimensions, which accounted for 57% of the variance in the data. Seven alternatives for control had high or independent factor loadings in the first dimension: spray roosts with tergitol, trap and gas redwings, destroy redwing nests and young, kill redwings in areas of severe damage; spray a contact poison on redwing roosts, use sterilants, and hunt redwings in agricultural areas. Plant "resistant" crops, plant spoil crops, and change agricultural practices to grow crps which are unattractive to redwings, comprised factor 2. The third factor consisted of three alternatives: capture and sell redwings for human consumption, process redwings for fertilizer or animal protein supplements, and market and export redwings. The fourth factor dealt with scaring devices and included use of frightening devices (visual) and use of noise makers. The responses to the control measures comprising each dimension then were used to construct the following attitudinal scales: 1) redwing control index (55% of the variance within the 4 dimensions), 2) change agricultural practices (18%), 3) consumptive uses of redwings (14%), and 4) use of scare devices (12%). Let redwings eat crops, spray chemical repellents on crops, and require farmers to buy insurance against redwing damage were alternatives which were not strongly associated with a factor. However, the respective factors with which there was a small degree of association were 2, 1 and 3.

The scales were recoded into three categories of response. Thus category 1 of the redwing control index (7 alternatives) comprised individuals who expressed complete support for at least four methods. Category 2 represented people who remained neutral on four or more alternatives, and category 3 consisted of respondents who were opposed to four or more of the control methods. Responses to the recoded scales are shown in Figure 3. The C.O.Q. was included for comparative purposes, but was not used in conducting the x^2 tests. A significant relationship ($p < 0.05$) was found between the sample group and response except in the case of the consumptive uses of redwings in which all groups responded similarly.

DISCUSSION

From the survey of Quebeckers in 1975, attitudes relating to hunting and trapping were polarized, as were those toward agricultural pest control. However, controlling predators, killing animals that damage farm crops, and hunting blackbirds in agricultural areas were viewed more favorably than many hunting and trapping activities currently popular in North America. Although people interested in the environment do not like to see animals killed, this suggests that their attitudes may be modified by economic and recreative values. This finding was substantiated in Survey III where members of the conservation organizations exhibited substantial differences in response to the redwing control index.

In Survey I, comparison between response to the A.P.C.I. and the categories of survey location showed that rural people have a very different perception of animals that damage farm crops than do most other groups. Lethal control of blackbirds would be applauded by a large segment of the agricultural community.

Respondents (G.P.) in the Canadian study (Survey III) were clearly opposed to the statement, "let redwings eat farm crops," and were sympathetic toward killing redwings in areas of severe damage. A large number of the C.E., predominantly those representing rurally located naturalist groups, were also in favor of killing redwings in areas of severe damage. It appeared that non-farming individuals closest to the problem (i.e. rural residents) were much more sympathetic toward farmers than were others.

The resistance encountered from the G.P. during the 3-phase sampling suggested that most Canadians do not consider the control of red-winged blackbirds which damage farm crops an issue of great importance. Since only 6.6% of the C.O,Q. members chose to return surveys, one might speculate that even among these highly conservation-oriented people there is not a great deal of concern. In fact, several C.O.Q. members supported, or remained neutral on, the redwing control index. Although the G.P. supported killing redwings in areas of severe damage and disapproved of allowing redwings to eat crops, and although Quebeckers were relatively favorable toward killing animals that damage farm crops,

many differences in opinion existed about the alternative(s) for controlling redwing damage. For example, in Survey III the G.P. and C.E. had comparable attitudes regarding the control of redwings, but the G.P. was less sympathetic toward changing agricultural practices and more interested in the consumptive uses of redwings than the C.E. This was probably due, in part, to the farmers among the G.P. sample. That the Q.F. was by and large opposed to cultural changes is extremely important, since the use of modified agricultural techniques may be the best way to solve the problem (Dolbeer et al. 1978), Also interesting was the Q.F. opposition toward consumptive uses of redwings, either as food source or fertilizer. Many indicated that they considered redwings unsuitable for human consumption. Overall, the primary reasons cited against the lethal control of redwings and the marketing and exportation of redwings were humanistic and ecologic in nature (Kellert 1978), Humanistic reasons center on concern for humaneness during all forms of control, while ecologic concerns focus mainly on the species specificity of the control. Fears of threatening or endangering the redwinged blackbird population were frequently mentioned. Economic concern was cited commonly with respect to the control and marketing of redwings, In this instance, respondents indicated that the economic feasibility of the control was the main determinant shaping their attitudes, This concern was shared by many people who said that efficiency was of primary importance, and economics and efficiency were highly interrelated. People who were in favor of using redwings for food and fertilizer harbored utilitarian attitudes (Kellert 1978), but many of these people did not wish to eat them.

Several interesting points emerged from the study of the Quebec farmers in Surveys II and III. An evaluation of available control techniques in Survey II revealed at least some of the reasons for the resistant attitudes the Q.F. (Survey III) held against changing cultural practices or using scaring devices. Since no control method was identified as being effective, it was not surprising that farmers who receive damage want to employ lethal control measures. The attitudes and beliefs of farmers must be modified before novel and/or non-lethal control methods will be adopted. Buys (1975) documented an identical situation in a study of coyote control and ranchers' attitudes in which ranchers generally viewed non-lethal methods as ineffective. In addition, rancher estimates of livestock killed by coyotes consistently exceeded those of biologists, a phenomenon often noted with redwing damage to corn (pers. obs.). However, in the present study (Survey II), reports of damage to grain and silage corn averaged 16%, which was approximately half of the value estimated in a report on vertebrate damage to Canadian agriculture by Solman, Laidlow and Miller (1975). While the value of 16% may still seem excessive, many farmers do sustain damage levels equal to and larger than this, especially those farming in areas adjacent to communal roosts (Martin 1977). As long as birds damage crops, the agricultural pest control issue will persist: and at specific times of the year in certain areas, producers need effective methods of reducing bird damage to crops. If this involved killing birds, we would conclude from the findings presented in this paper that there would be little, it any, adverse public reaction; particularly if the killing was in an area of severe damage, and the public was well informed of the situation. What is not clear, however, is the potential ecological repercussion which could result from widespread, unwarranted killing of blackbirds (Weatherhead et al. 1980). Carefully planned and executed studies are needed to examine the ecological relationships involved prior to the institution of large scale control programmes.

ACKNOWLEDGEMENTS

We are very grateful to Tamara Jones, Michele Prevost and Teresa Zabek for their contributions to the study. Joanne Barbeau, Martin Silverstone and many others deserve credit for their assistance. A special thanks goes to Mr. Kurt Webb, Arizona State University and the Boyce Thompson Southwestern Arboretum, Superior, AZ. Funding for this study was provided by Agriculture Canada, the Quebec Department of Agriculture, Quebec Agricultural Research Council, McGill University Faculty of Graduate Studies and Research, and the Macdonald-Stewart Post Graduate Fellowships.

LITERATURE CITED

Arthur, L.M., R.L. Gum, E.H. Carpenter and W.W, Shaw. 1977. Predator control: The public viewpoint. Trans. N. Am. Wildi. Nat. Resour. Conf. 42: 137-145.

Buys, C.J. 1975. Predator control and ranchers' attitudes. Environment and Behavior 7(1): 81-98.

Clark, R.G. 1979. Attitudes of Ouebeckers toward environmentally-related outdoor activities and agricultural pest control, M.Sc Thesis, McGill Univ. Montreal. 79 pages.

Dillman, D., J. Christensen, E. Carpenter and R. Brooks. 1974. Increasing mail questionnaire response: a four state comparison. Am. Soc. Rev. 39: 744-756.

Dolbeer, R.A., PP. Woronecki, A.R. Stickley Jr. and S.B. White. 1978. Agricultural impact of a winter population of blackbirds and starlings. Wilson Bull. 90: 31-44.

Graham, F. Jr. 1976. Blackbirds a problem that won't fly away. Audubon 78: 118-125.

_____1978. Problem birds: blockbuster weapon on way. Audubon 80: 99-101.

Jackson, J.A. 1976. Blackbirds, scare tactics and irresponsible legislation. Wilson Bull. 88(1): 159-160.

Kellert, S.R. 1978. Policy implications of a national study of American attitudes and behavioral relations to animals. Rept. to the U.S. Fish Wildl. Serv. Washington, D.C. September 1978. 124 pages.

Rummel, R.J. 1967. Understanding factor analysis. J. Conflict Resolution 11:444-480.

Solman, V.E.C., D. Miller and G. Laidlow. 1975. Report on vertebrate damage to Canadian agriculture. C.W.S. unpubi. report. Ottawa. 26 pp. mimeo.

Weatherhead, P.J., R.G. Clark, JR. Bider and R.D. Titman. 1980. Movements of blackbirds and starlings in southwestern Quebec and eastern Ontario in relation to crop damage and control. Can. Field Nat. 94(1): 75-79.

Weatherhead, P.J., JR. Bider and R.G. Clark. 1979. On the feasibility of surfactants as a blackbird management tool in Quebec. Proc. Eighth Bird Control Seminar, Bowling Green, Ohio.

Table 1. Activities comprizing the agricultural pest control factor, ranked in order of descending factor loading.

Activity	Mean*	Standard Deviation	Factor Loading
Capturing and killing red-winged blackbirds found feeding in cornfields	4.41	1.45	0.80
Gassing trapped blackbirds caught feeding in cornfields	4.61	1.46	0.71
Hunting blackbirds in agricultural areas	3.96	1.45	0.68
Shooting woodchucks in pastures	4.58	1.47	0.65
Shooting crows	4.36	1.46	0.65
Killing animals that damage farm crops	3.77	1.44	0.64
Kill trapping nuisance grey squirrels	4.68	1.37	0.63
Killing ducks which destroy agricultural crops	4.39	1.34	0.57
Processing and selling red-winged blackbird breasts for an export market	4.91	1.22	0.56
Controlling predators (wolves, fox, raccoon, skunk)	3.49	1.60	0.46

* Means are based on a 6-point scale ranging from "very much for"(1) through "violently opposed"(6)

Means in Table 3 are based on a 7-point scale ranging from "very strongly agree"(1) through "violently opposed"(7).

Table 2. Control methods used by Quebec farmers in 1976 and rating of efficiency.

Control Method	Frequency of use in 1976		Efficiency[a] rated as being			
	n	%	Useless	Fair	Good	Very Good
Shotgun	365	64	154	162	30	27
Exploder guns (Carbide, Acetylene)	103	18	22	60	17	12
Scarecrow	83	14	45	46	9	1
Chemicals (Avitrol, Methiocarb)	11	2	6	3	2	3
Firecrackers	8	1	5	4		1
Avalarm	4	0.5	3	1	1	

[a]The control method was rated if the farmer had used it during, or prior to, 1976.

Table 3. Mean response and standard deviation for 18 alternatives for the control of red-winged blackbirds for three sample groups. Values in parentheses are sample sizes. (See footnote Table 1.)

Alternative for Redwing Control	General Public (475)		Quebec Farmers (80)		Conservation Executives (74)	
	$\bar{X}$	1 S.D.	$\bar{X}$	1 S.D.	$\bar{X}$	1 S.D.
Use visual frightening devices	2.7	1.1	3.2	1.9	2.6	1.0
Use noise makers	3.2	1.4	3.3	2.0	3.2	1.3
Plant "resistant" crops	3.2	1.4	3.3	2.0	2.5	1.3
Kill redwings in areas of severe damage	3.9	1.5	2.2	1.5	3.9	1.5
Plant spoil crops	3.8	1.4	4.5	1.9	3.4	1.4
Use sterilants to reduce reproduction	4.05	1.6	2.1	1.5	3.9	1.6
Change agricultural practices and grow crops which are unattractive	4.2	1.2	5.3	1.7	3.5	1.6
Market and export redwings for human consumption	4.2	2.1	4.7	2.4	4.9	2.0
Require farmers to insure against damage	4.2	1.4	4.4	2.0	3.9	1.2
Hunt redwings in agricultural areas	4.3	1.4	2.1	1.6	4.6	1.3
Process redwings for fertilizer or livestock feed	4.8	1.4	3.7	2.0	5.3	1.4
Compensate farmers for crop losses	4.8	2.0	3.5	2.6	4.0	2.2
Capture and sell redwings for human consumption	4.9	1.4	4.9	1.8	5.3	1.4
Spray chemical repellents on crops	4.9	1.6	3.3	2.1	5.6	1.4
Destroy redwing nests and young in the spring	4.95	1.4	2.4	1.7	5.1	1.4
Trap and gas redwings found feeding in cornfields	5.2	1.4	2.9	2.1	4.9	1.6
Let redwings eat crops	5.3	1.1	6.6	1.1	4.6	1.0
Spray redwing roosts with a contact poison	5.5	1.3	2.7	1.8	6.1	1.1
Wet redwings on cold nights so they die of exposure	5.8	1.2	3.4	2.0	6.0	1.1

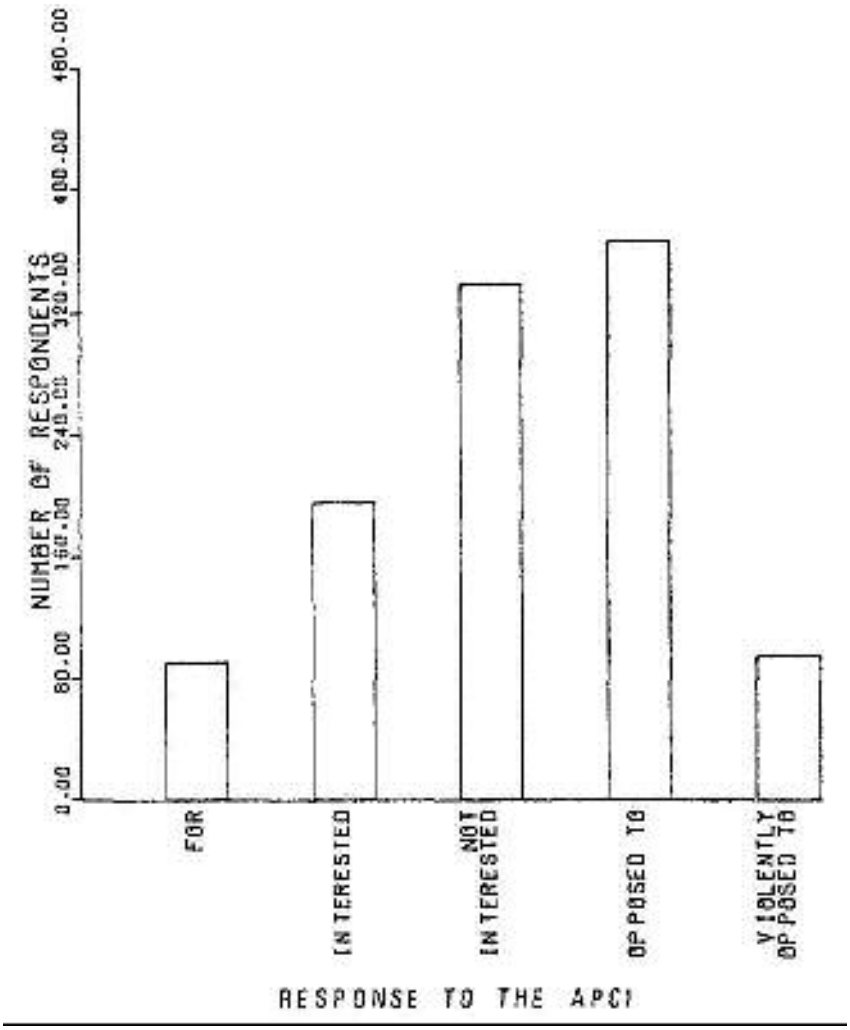

Figure 1. The number of respondents categorized according to their response to 5 categories of the Agricultural pest control index: for, interested in, not interested in, opposed to and violently opposed to.

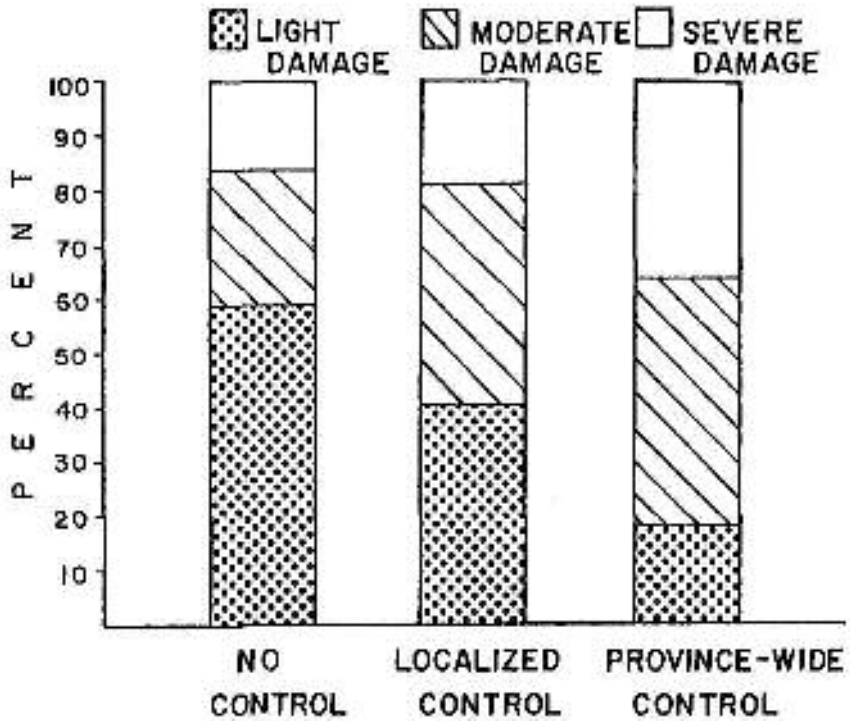

Figure 2. The relationship between perceived level of crop damage by blackbirds and endorsement of lethal control of blackbirds.

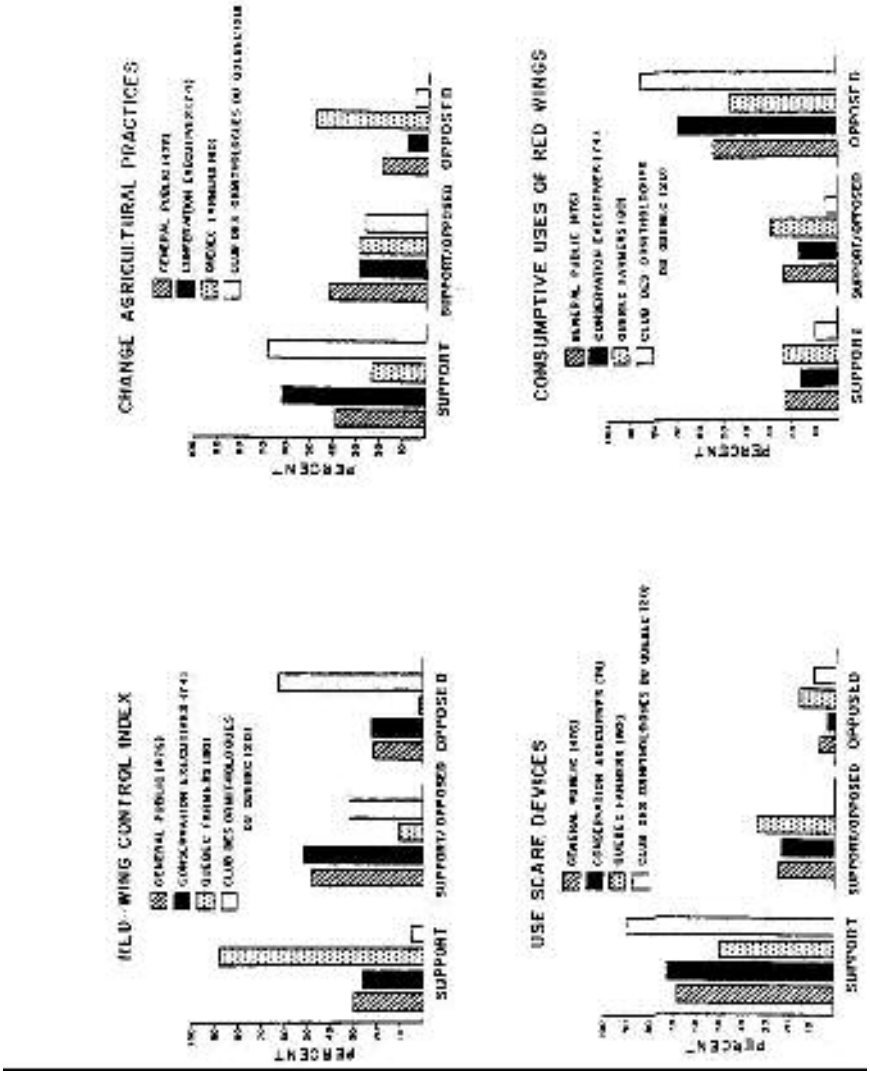

Figure 3. Histograms indicating response rates to 4 attitudinal Scales according to 4 sample groups.