

HUNTER SATISFACTION WITH THE SELECTIVE HARVEST SYSTEM
FOR MOOSE IN NORTHERN ONTARIO

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Abstract: In response to a declining moose population in Ontario, a selective harvest system has been introduced in the province. This paper examines the perceptions of hunters to this new management strategy as measured in studies conducted in 1985 and 1986. Hunter attitudes to the selective harvest system were found to be somewhat polarized. A number of variables were examined to explain this variation in attitude. Hunter knowledge was found to be significantly related to hunter attitude towards the selective harvest system ($r = 0.52$, and $r = 0.51$ for the two samples tested). Overall the results were quite similar between the 1985 and the 1986 study.

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In the fall of 1983, the Ontario Ministry of Natural Resources (MNR) introduced a selective harvest system for managing moose (*Alces alces*) in response to the declining moose population in the province. The objectives of the program were to double the moose herd by the year 2,000, to increase hunting opportunities, and to provide economic returns for Ontario.

An important feature of the selective harvest system was to shift the hunting pressure from adult moose to calves, in order to increase the size of moose herds. "Spared by the hunter, the cow ... is likely to keep producing offspring. And the female calf, surviving with the protection of the cow, will make its own contribution to the herd. After five years, ten adults and five calves - three times the number when a cow was shot - is the likely result" (MNR, 1984). A second important feature of the selective harvest system was the lottery system, in which hunters were required to participate in a computerized random draw in order to receive permission (a hunting tag) to hunt an adult moose. The number of tags distributed each year was based on the hunting success rate from the previous season. Using these procedures, Sweden, Norway and Finland have successfully increased their moose population.

The MNR has been monitoring the size of the moose herds and also hunter success rates, but to date have not surveyed the attitudes of hunters regarding the selective harvest system. Hunter attitudes are an important part of wildlife management, if the ultimate goal is to provide satisfying hunting experiences (Hendee and Potter, 1971). Further, the ultimate success of wildlife management depends somewhat on the extent to which hunters comply with hunting regulations, and compliance stems from attitudes or satisfaction with the wildlife management program. For these

reasons, a research program was started in 1985 to examine attitudes of hunters in Northern Ontario to the selective harvest system. This paper describes two studies conducted in the Thunder Bay District of Northern Ontario.

In the past, game management in North America has been guided by two objectives: game bagged and days afield (Potter, Hendee & Clark, 1973). The game bagged objective assumes that hunter satisfaction is determined primarily by the amount of game harvested. The days afield objective implies that aggregate hunter satisfaction is a function of the man days afield, as well as game bagged. Both objectives have their limitations. The game bagged theory is limited by the capacity of the habitat to produce game and the distribution of benefits is primarily to the most skillful hunters. The days afield approach is limited by the assumption of constant levels of benefits per hunter man-day regardless of success or quality of the experience.

Recently, a "multiple-satisfaction" approach to game management has emerged in response to the weaknesses in the game bagged and days afield approaches (Hendee, 1974). The multiple satisfactions approach assumes that hunter satisfaction is determined by a number of factors or dimensions such as (1) being outdoors (appreciating nature), (2) escapism (from daily routines), (3) companionship, (4) displaying hunting skills, (5) displaying trophies of hunting experience (6) harvesting, and (7) working with equipment (guns and hunting paraphernalia). Empirical studies (Potter et al., 1973; Hautaluoma & Brown, 1978) suggest that some of these dimensions are generic to all kinds of hunting; others are more specific to particular kinds of hunting. Further, some hunters will not hunt for the same reasons (motives) as other hunters.

Considerable research conducted on measuring recreation satisfaction can be applied to measuring hunter satisfaction. Using models developed by industrial psychologists measuring job satisfaction (Lawler, 1973, Vroom, 1964), recreation satisfaction has been defined in terms of the various expectations, and preferences people hold regarding a specific recreational activity. The extent to which the recreation experience matches expectations and/or preferences determines the level of recreation satisfaction (Clark & Stankey, 1979; Dorfman, 1979; Driver, 1979; Gramman & Burdge, 1981; Heberlein, 1977; Schreyer & Roggenbuck, 1978). Since expectations and preferences are related to goals or motives for a particular activity, it is important to understand hunter motivation in order to understand why hunters are satisfied or unsatisfied.

With these concerns in mind, the objectives developed for this study were to measure overall attitude or satisfaction of hunters to selective harvest strategies, attitudes regarding hunters co-operation and compliance, hunter knowledge of the selective harvest system, and hunter motives.

METHODS

The data for this study was collected in two mail surveys of moose hunters in Northern Ontario, in 1985 and 1986. In the 1985 study a random sample of 242 hunters was selected from those applicants who were successful in the lottery for obtaining a tag to hunt an adult moose in wildlife management unit 13 (WMU13). This represented a 10% sample of the survey population. This procedure was repeated in 1986 with a sample of 300 hunters (a 10% sample) from WMU15B.

These two management units were selected because hunter education had taken place in these districts, and the research was aimed partly at assessing the impact of these educational strategies. By the same token, however, hunters in these management units cannot be considered representative of hunters elsewhere, by virtue of their exposure to these hunter education communications.

The implementation of these studies was modelled after the approach described by Dillman (1978) for conducting mail surveys. Central to this approach are a number of techniques designed to increase the response rate. The cover letter with each questionnaire clearly explained the purpose and importance of the study, the significance of the study to the respondent, and the importance of each completed survey. Each mail-out package contained a cover letter, a questionnaire, a stamped and addressed return envelope. Dillman suggests employing as many as three follow-up questionnaires to non-respondents. In the 1985 study, time constraints limited this procedure to just one follow-up. Nevertheless a total of 194 (80%) usable questionnaires were returned after two mailings. In 1986, three follow-up mailings were used. Similar results were obtained, including a response rate of 81%.

RESULTS

Overall Attitude

Overall attitude to the selective harvest system (Table 1) was measured with a four item semantic differential scale (Kidder, 1981). This scale could assume values ranging from a low of 4 (extremely negative attitude) to a high of 28 (extremely positive attitude) with a score of 16 representing a neutral attitude. The data in these studies indicate that

hunters rate the selective harvest system "slightly positively", since the mean response scores were 18.23 in 1985 and 19.27 in 1986. However, the standard deviation scores indicate considerable variation in attitudes. (Table 1) Evidently there is a suggestion that some polarity in hunter attitudes harvest system exists, with hunters holding both positive and negative attitudes.

Table 1. Overall attitude of moose hunters to be selective harvest system for moose management in Northern Ontario.

Overall Attitude	Mean ¹	Standard		Validity ³
		Deviation	Reliability ²	
1985 (MMU 13)	18.23	6.86	0.93	0.62
1986 (MMU 15B)	19.27	6.80	0.92	0.62

1. Scale values range from 4 (extremely negative) to 28 (extremely positive). Means not significantly different using students t-test ($\alpha = .05$).
2. Reliability measured with Crombach's Alpha.
3. Convergent validity, computed by correlating with a second independent scale measuring overall attitude.

By using multi-item attitude scales such as this, it is usually possible to obtain higher degrees of reliability than with a single item scale. In this case, the four item attitude scale has a very high reliability for both studies as computed with Crombach's alpha. Crombach's alpha measures reliability on a scale of 0-1, where scores near 1 indicate high reliability or precision of measurement. The validity of the

attitude scale was estimated with a measure of convergent validity obtained by comparing the scores with a second scale measuring the same attitude, a twenty item Likert Scale (Kidder, 1981). The two scales were compared using Pearson's product-moment correlation which indicated a fairly strong relationship for both studies. Since overall attitude was the major variable considered in this study, it was important to use these rigorous checks on the validity and reliability of the scale used to measure attitude.

No significant difference exists between the mean attitude scores of the two studies. Since these WMU's are hunted primarily by people from the same region (ie. Thunder Bay), the similarity in attitude scores can be interpreted as a measure of stability of hunter attitudes over time.

As well as measuring overall attitude or satisfaction with the selective harvest system, it is important to understand why hunters are satisfied or unsatisfied. Hunter attitude or satisfaction may be determined by a number of factors as in Table 2. In both studies knowledge was significantly related to attitude. This result indicates that hunters with little specific knowledge of the hunting regulations and related biological principles tend to hold negative attitudes to the selective harvest system, while hunters with better knowledge will hold more positive attitudes. This finding underscores the importance of communicating to hunters the biological principles that form the basis of the selective harvest system. From a theoretical perspective, this relationship between knowledge (beliefs) and attitude has been clearly identified in the psychological literature dealing with attitude measurement (Fishbein & Ajzen, 1975). Further, it is important to recognize that since the correlation values are .51 and .52, then just 27%

(r^2) of the variation in attitude can be explained by knowledge. The remaining 75% of the attitude variation is explained by other factors, not uncovered in this study.

Table 2. Correlations of selected items with overall attitude to the selective harvest system in Northern Ontario.

Item Correlated With Overall Attitude	Significance (p)	
	1985	1986
Knowledge of the selective harvest system	0.000 ¹	0.000 ²
Participation in a hunter education course	0.668	0.161
Personal success shooting an adult moose	0.153	0.443
Personal success shooting a calf	0.442	0.957
Success of a group member shooting an adult moose	0.679	0.497
Success of a group member shooting a calf	0.184	0.129
Years of hunting	0.162	0.001 ³
Age	0.392	0.011 ⁴
Income	0.266	0.325
Education	0.412	0.469

1. Positively correlated (R = 0.52)
2. Positively correlated (R = 0.51)
3. Negatively correlated (R = -0.21)
4. Negatively correlated (R = -0.15)

In the 1986 study, years of hunting and hunter age were also related to overall attitude, but the relationship was weak in both cases. Further, the relationships were negative indicating that older hunters were less satisfied, and that more experienced hunters were less satisfied.

Motives of Moose Hunters

Table 3 displays the responses of hunters to 12 motives or reasons suggested to account for why they enjoy hunting moose. There is strong agreement or consensus on a number of items: nature appreciation, companionship, challenge of tracking wild animals, physical exercise, stress release, practicing outdoor skills, and working with equipment.

Table 3. Expressed motives for hunting moose in Northern Ontario.

	Standard Deviation		Mean Response ¹	
	1985	1986	1985	1986
Nature appreciation	0.80	0.76	4.57	4.55
Cheap meat	1.57	1.48	2.75	2.12 ²
Companionship	1.04	0.83	4.23	4.47 ²
Display hunting skills	1.32	1.37	2.31	2.68 ²
Challenge of shooting a wild animal	1.39	1.37	3.49	3.50
Challenge of tracking a wild animal	0.93	0.90	4.49	4.35
Exercise	1.10	1.10	4.09	4.02
Stress release	1.03	1.01	4.35	4.37
Status of shooting a wild animal	1.42	1.38	2.64	2.79
Practice outdoor skills	1.03	1.12	4.21	4.02
Solitude	1.22	1.19	4.00	3.92
Working with equipment (guns, etc.)	1.04	0.96	4.00	4.07

1. Mean response varies from 1 (strongly disagree) to 5 (strongly agree).
2. Significant difference between 1985 and 1986 responses (using the student's t-test for independent samples).

There is considerable variation and lack of consensus regarding four items: for meat, to display hunting skills, challenge of shooting a wild animal and status of shooting a wild animal. There is some suggestion of change in motive structure over time, as indicated in the change of mean response between 1985 and 1986 for three motives: cheap meat, companionship, and display of hunting skills. One explanation for this change could be expressed in terms of hunters providing more "socially desirable responses" while really holding a different set of motives than what they indicate on the questionnaire. However, a more plausible explanation is that, in face of the perceived increased difficulty of successfully shooting a moose, hunters are "substituting" the cheap meat motive for other motives that are more likely to be fulfilled (Hendee & Burdge, 1974).

Attitude Toward Hunter Co-operation and Compliance

Hunters agree (Table 4) that without their co-operation, the moose resource will suffer and the hunters as well. However, perceptions of compliance vary when respondents rate the compliance of "most hunters", "my hunting companions", and personal compliance. This results suggests two possible interpretations. Either, most respondents misrepresent their personal level of compliance in the questionnaire; or, there is a high level of compliance and most respondents are poor at observing the activities of their hunting companions, and other hunters.

Table 4. Attitudes of moose hunters toward hunter co-operation and compliance.

Issue	Mean Response		Standard Deviation	
	1985	1986	1985	1986
Without hunter co-operation, the moose will suffer	4.59	4.52	0.73	0.85
Without hunter co-operation the hunter will suffer	4.57	4.48	0.74	0.95
Most hunters comply with the regulations	3.19	3.56 ²	1.48	1.32
My hunting companions comply with the regulations	4.16	4.24	1.27	1.13
I comply with the regulations	4.55	4.43	1.02	1.03

1. Scale values vary from 1 (strongly disagree) to 5 (strongly agree).
2. Significant difference between 1985 and 1986, using the student's t-test for independent samples ($\alpha = .05$).

CONCLUSIONS

Overall, attitude to the selective harvest is slightly positive, but more important is the fact that there is considerable variation in attitude with many hunters supportive and yet a large proportion not supportive. Part of this variation in attitude is explained by the knowledge hunters have about the program and the biological principles upon which the program is based. Hunter attitudes can be influenced somewhat with greater awareness by hunters of the rationale for the management system, but only if the outcomes of the selective harvest system are consistent with the individual hunter's motive structure. For example, if meat is a strong motive, then any management system that restricts the fulfillment of this motive will never be acceptable.

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REFERENCES

- CLARK, R.N. and G.H. STANKEY. 1979. The recreation opportunity spectrum
USDA Forest Service General Technical Report PNW-98.
- DILLMAN, D. 1978. Mail and telephone surveys: The total design method.
Toronto: John Wiley & Sons.
- DORFMAN, P.W. 1979. Measurement and meaning of recreation satisfaction.
Environment and behavior. 11(4), 483-510.
- DRIVER, B.L. 1979. Quantification of outdoor recreation preferences
Research, Camping and Environment Education. Penn State HPER series
11, 165-487.
- FISHBEIN, M. and I. AJZEN. 1975. Belief, attitude, intention and
behavior: An introduction to theory and research. Don Mills:
Addison-Wesley.
- GRAMMAN, J.H. and R.S. BURDGE. 1981. The effect of recreation goals in
conflict perception: The case of waterskiers and fishermen. Journal
of Leisure Research, 13(1), 5-27.
- HAUTALUOMA, J. and J. BROWN. 1978. Attributes of the deer hunting
experience: a cluster-analytic study. Journal of Leisure Research,
10(4), 271-287.

- HEBERLEIN, T.A. 1977. Density, crowding and satisfaction: sociological studies for determining carrying capacities. Proceedings: river recreation management and research symposium. USDA Forest Service General Technical Report NC-28, 67-76.
- HENDEE, J.C. 1974. A multiple satisfactions approach to game management. Wildlife Society Bulletin, 2(3), 104-113.
- HENDEE, J.C., and R.J. Burdge. 1974. The substitutability concept: implication for recreation research and management. Journal of Leisure Research, 6(2), 157-162.
- HENDEE, J.C. and D.R. POTTER. 1971. Human behavior and wildlife management: needed research. Thirty Sixth North American Wildlife and Natural Resources Conference Transactions, 383-396.
- KIDDER, L.H. 1981. Research methods in social relations. Toronto: Holt, Rinehart & Winston.
- LAWLER, E.F. 1973. Motivation in work organizations. Belmont, C.A.: Wadsworth.
- MINISTRY OF NATURAL RESOURCES. 1984. Moose hunters handbook.
- POTTER, D.R.; HENDEE, J.C. and R.N. CLARK. 1973. Hunting satisfaction: game, guns or nature? Thirty Eighth North American Wildlife and Natural Resources Transactions, 220-229.
- SCHREYER, R. and T.W. ROGGENBUCK. 1978. The influence of experience expectations on crowding perceptions and social-psychological carrying capacity. Leisure Sciences, 1(14), 373-394.
- VROOM, V.H. 1964. Work and motivation. New York: John Wiley & Sons.