AN OVERVIEW OF A HUNTER OPINION SURVEY OF SATISFACTION WITH THE ONTARIO MOOSE MANAGEMENT SYSTEM

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ABSTRACT: Several changes have been made to the adult moose tag allocation system, since the Selective Harvest System was implemented in Ontario, in 1983. The last of these changes was the initiation of a group application process in 1992. This study was the most recent effort to determine hunter satisfaction with Ontario's moose management system. A sample of 3,783 hunters was surveyed about their opinions regarding the moose management system. The study identified several areas of satisfaction and dissatisfaction with management aspects, such as group applications, tag quota ratios (hunters applying versus available tags), two-pool lottery draw, and hunting regulations. While hunters supported selective harvest and lottery draw, there was evidence that hunters were confused by the complexity of the system. The hunters' lack of understanding of how the moose management system operates, may be a major cause of their dissatisfaction.

ALCES VOL. 31 (1995) pp.247-254

In Ontario, between 1951 and 1974, moose hunter numbers increased from 60,000 to 90,000. Hunting pressure during this period was unevenly distributed, such that moose (*Alces alces*) in remote or inaccessible areas, were not being harvested. During the 1970s, game managers made numerous attempts to increase the moose population, without success, and hunter satisfaction continued to decrease (Buss and Truman 1990). In 1983, the Ontario Ministry of Natural Resources (OMNR) implemented a Selective Harvest System, requiring hunters to identify the age and sex of moose prior to harvesting. In 1992, to accommodate the ever-increasing number of moose hunters, the OMNR introduced a group application system. Its purpose was to improve the distribution of adult moose tags among hunting parties, without decreasing the chances of individual hunters who applied for adult moose validation tags (OMNR 1991).

Previous studies (Borovsky 1985, Rollins 1987, Romano 1988) did not examine the satisfaction of moose hunters who were unsuccessful in the lottery draw. The potential exists that these hunters may perceive the allocation system as unfair. Similarly, dissatisfaction of hunters with other aspects, such as the group application process or enforcement of the Selective Harvest System may colour hunters' overall opinion of the moose management system.

In North America, wildlife is believed to be the collective property of the people (Forsyth 1993). The phrase "tragedy of the commons", coined by Garrett Hardin (1968), has come to symbolize the degradation of the environment to be expected whenever many individuals use a scarce common resource without effective regulation of consumption (Ostrom 1990).

Berkes (1989) stated that common property has five basic functions: livelihood security (distribution of the resource among co-owners), access equity and conflict resolution (implementation of rules), mode of production (profit from the resource), resource

conservation (sanctions against excessive individual gain), and ecological sustainability (maintenance of resource for future generations). The perception that allocative decisions are not explicit, fair, or enforced will lead to resource degradation (Berkes 1989).

Ontario resident moose hunters comprise a large group of people who use common resources and the number of government officials assigned to monitor the use of these resources is small. The potential for overuse or misuse is great. Moreover, if moose hunters perceive the lottery draw or the group application system for adult tags as unfair, then the chance of disobeying regulations may be greatly increased (Rollins 1987). Berkes (1989) outlines three ways in which allocative disorders (Tragedy of the Commons), such as poaching, or bagging of game which hunters are not licensed for, may arise. These disorders are: open access conditions and a demand greater than the annual sustainable level of harvest; poorly defined 'rights-to-use'; and a breakdown in the system of enforcement of either limits to access or the right-to-use. Research surrounding common resources indicates that low public support for the wildlife management system, may impact on the observance of regulations by common resource users (Rollins 1987, Berkes 1989).

Permit allocation systems used in situations where the demand for a resource exceeds the supply of the resource, attempt to distribute permits in a manner which is "socially just" (Shelby *et al.* 1989). This "distributive justice", is based on goals such as "equality (equal shares or equal chances), equity (unequal shares based on inputs), social efficiency (where those who value the experience most have priority), and recognizing the needs of particular user groups" (Shelby and Heberlein 1986).

The study was designed to assess the level of satisfaction of Ontario moose hunters with aspects of the moose management system. It was hypothesized that dissatisfaction with any or all of these aspects, could cause hunters to complain, stop hunting, or not comply with conservation regulations. Thereby, one or a few aspects of the moose management system could be working against otherwise positive program attributes. Only the most pertinent findings were communicated in this paper. This paper is the result of an undergraduate study conducted through Lakehead University (Hansen 1995).

METHODS

A sample of 3,783 Ontario gun hunters, who had applied to the adult moose validation tag draw in each of the past three years (1991-1993), were randomly selected from the OMNR hunter files and surveyed during the fall of 1994. They were pre-stratified and proportionately sampled according to: (1) whether or not they had switched Wildlife Management Units(WMU); (2) their proximity to their WMU; and (3) their age. The assumption was made that hunters who had applied in each of the past three years, would be familiar with the Selective Harvest System, the lottery draw adult moose validation tag allocation process, and the group applications procedure. Although not part of the pre-stratification process, hunter success at obtaining an adult moose tag within the past four years (1991-1994), tag quota ratios (number of hunters applying for adult tags versus the number of available tags), and groupings based on the hunters' characteristics (e.g. affiliation with wildlife organizations), were major factors in analyses.

Hunters in the sample were sent survey packages, which included cover letters, bilingual questionnaires, and pre-stamped return envelopes. Fifty percent of the non-respondents were mailed a follow-up letter. A total of 2,007 usable surveys were returned for a 53% response rate. Two databases were created, one with the survey responses and a second containing categorical data from

OMNR hunter files. The two databases were merged using the hunters' survey identification numbers contained in both files. Questionnaire responses were in a Likert-type format; a closed and structured format that made replying to the survey less time consuming for respondents (Payls 1992), allowed more questions to be asked, and permitted machine scoring of the data. Responses ranged on a scale from one to five, where "1" was "strongly disagree", "2" was "slightly disagree", "3" was "neither disagree/agree", "4" was "slightly agree", and "5" was "strongly agree". Data were analyzed using the Statistical Package for Social Sciences (SPSS for Windows) and employing frequency counts, cross tabulations (Chi-squared), correlations, T Tests, and Analysis of Variance (ANOVA) to evaluate differences in hunter responses according to various classifications.

The OMNR data set included respondents' proximity, age class, ratio of hunters to tags in their WMU, a code to indicate whether the hunter switched WMU, and a code to show the hunters' success at obtaining a tag in the lottery draw between 1991 and 1994.

Hunter proximity was defined as the approximate distance from the hunter's residence (mailing address) to the WMU of his/her first choice in 1993. The following four categories were developed: <300 km; between 301 km and 600 km; between 601 km and 900 km; and >900 km. The WMU ratio of hunters to tags was determined by adding the number of bull and cow tags each year, between 1991 and 1993, and comparing them to the number of hunters applying for adult tags in each of those years. The four ratio categories established were: (1) <1:1; (2) >1:1 =< 4:1; (3) >4:1 =< 8:1; and (4) >8:1. Since some WMUs had ratios that varied greatly between the years, these WMUs were coded separately as excluded WMUs. Excluded WMUs generally had a ratio between 4:1 and 8:1. The hunters' switch code showed whether hunters switched between WMUs of different hunter to tag ratios and whether or not the hunters switched to WMUs of higher or lower ratios over the three year period. The following four age classes were provided: <30 years; between 31 and 45 years; between 46 and 60 years; and between 61 and 75 years. The hunter's success in the lottery draw was coded according to the number of years between 1991 and 1994 that the hunter had received a tag.

RESULTS AND DISCUSSION

Generally, the Selective Harvest System has been received favourably by Ontario moose hunters. They were supportive of selective moose harvesting, in principle ($\bar{x}$ = 4.0)(3.0 is the median; anything greater indicates agreement; and anything less indicates disagreement). Respondents indicated that they did not trust the OMNR ($\bar{x}$ = 2.1) and were not confident that the OMNR was doing a good job of conserving the moose resource ($\bar{x}$ = 3.1). Most respondents (1,350) agreed that moose harvest quotas should be based on moose population counts ($\bar{x}$ = 4.5), but they did not believe that these counts were being conducted frequently enough ($\bar{x}$ = 2.7). Public announcements of budget cutbacks and less frequent moose counts have probably affected the hunters' opinions. The distrust of the OMNR may have been a result of hunters' limited understanding of how the actual management system operates. Forty-one percent of hunters disagreed that the process for setting quotas was understandable ($\bar{x}$ = 2.9), and thereby indicated that this process was unclear to them. Overall, respondents were not satisfied with the tag quotas in the WMUs which they hunted ($\bar{x}$ = 2.6).

Hunters gave understandability of the group application system a marginal rating ($\bar{x}$ = 3.1). Other aspects were consistently rated as unsatisfactory. Respondents did not believe the system to be fair ($\bar{x}$ = 2.6), perhaps,

because they did not believe that it satisfactorily distributed adult moose tags among hunters ($\bar{x} = 2.7$), especially their own hunting party ($\bar{x} = 2.8$). Dissatisfaction with the group application process (Fig. 1) and the two-pool lottery draw (Fig. 2) increased as the hunters' WMU hunter to tag ratio increased. Hunters in WMUs with more than eight hunters for every available tag showed the greatest dissatisfaction with the system of fairness and distribution of tags. Members of the Ontario Federation of Anglers and Hunt-

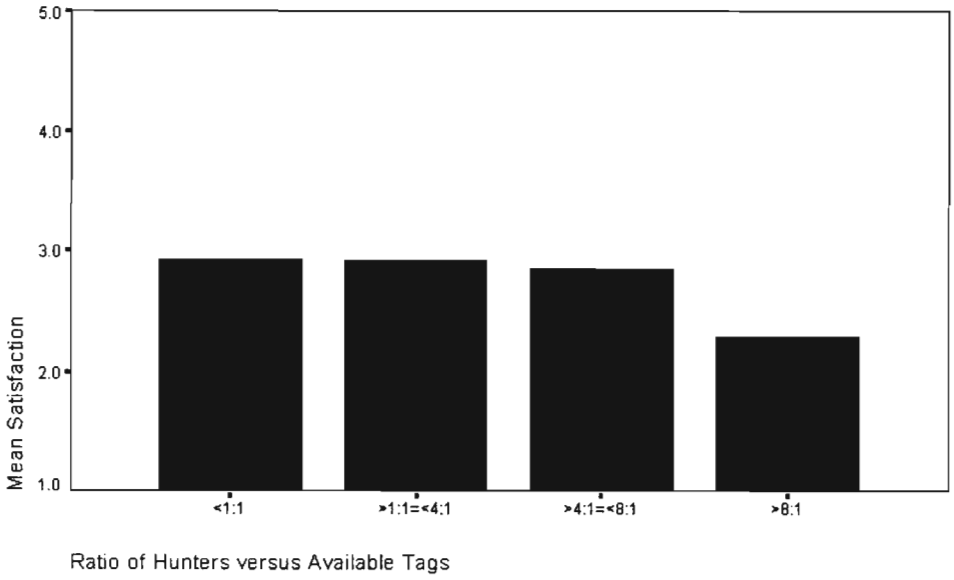

Fig. 1. Mean hunter satisfaction with the Ontario group application process according to the ratio of hunters versus available tags in their Wildlife Management Unit (WMU).

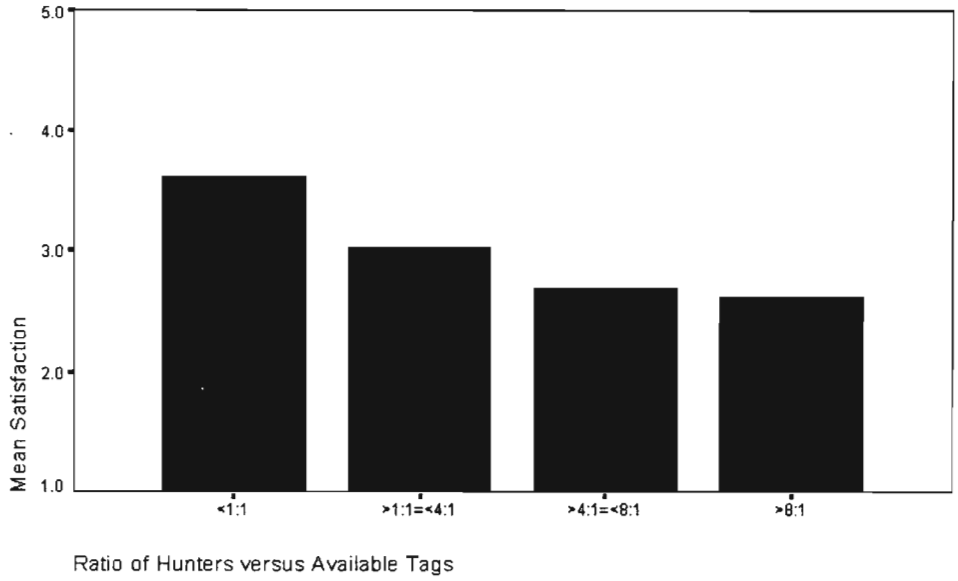

Fig. 2. Mean hunter satisfaction with Ontario's two-pool lottery draw according to the ratio of hunters versus available tags in their Wildlife Management Unit (WMU).

ers (OFAH) showed greater support for the principle of group applications ($\bar{x}$ = 3.2), perhaps because the OFAH was instrumental in the implementation of group applications and had better informed its membership.

Although adult moose tag allocation was perceived as slightly understandable ($\bar{x}$ = 3.2), hunters did not agree that it was satisfactory ($\bar{x}$ = 2.9) or fair ($\bar{x}$ = 2.7).

Respondents' dissatisfaction with the allocation system may have been a result of their dissatisfaction with the interval at which they received moose tags ($\bar{x}$ = 2.6) and moose meat ($\bar{x}$ = 2.8). Hunters were generally dissatisfied because they perceived that some hunters received more tags than average ($\bar{x}$ = 4.1). Furthermore, almost 75% of the respondents believed that the number of years since a hunter obtained an adult tag should influence his/her future chances of obtaining a tag ($\bar{x}$ = 4.1 and see Table 1).

Overall, dissatisfaction with the two-pool draw system increased in proportion to the ratio of hunters to available tags (Table 1). Hunters in high ratio WMUs showed more dissatisfaction with the understandability and fairness of the lottery draw, and the interval at which they received tags and moose meat. One percent of hunters (29 of 3,783) from the sample were successful in obtaining an adult tag in all four years (1991-1994). Another 3% (113) received three tags in the same period. The average number of tags a survey respondent received over a four year period was one or two. Not surprisingly, the 30% of hunters (1,143) who received two tags in four years were more satisfied since this was the ratio that was generally advertised and used as an example in OMNR publications. However, an even larger number of hunters (66%)

Table 1. Mean hunter satisfaction with aspects of the Ontario moose allocation system, on a scale of 1 to 5 (1 is strongly disagree, 5 is strongly agree), according to the hunter-to-tag ratio of their WMU.

Question	<1:1	>1:1 =< 4:1	>4:1 =< 8:1	>8:1
1. Ontario's Selective Harvest System is understandable.	4.0370	3.4733	3.2159	3.1173
2. The process for setting adult moose tag quotas is understandable.	3.6296	3.1095	2.8680	2.7005
3. Pool draws are good allocation systems.	3.9259	3.4915	3.1021	3.1357
4. The present two-pool draw system is fair.	3.1074	2.9627	2.5714	2.3487
5. I receive adult moose tags at satisfactory intervals.	3.5926	3.0911	2.2526	1.9741
6. I obtain moose meat at satisfactory intervals.	3.1200	3.1152	2.6691	2.4278
7. In a WMU, over a period of years, no hunter should get a second tag until every hunter has received one tag.	2.6667	3.1813	3.4190	3.7337
8. The number of years since a hunter obtained an adult tag should influence future chances of getting a tag.	3.7037	3.9788	4.1226	4.3093

only received one tag (1,539) or no tags at all (959) in a four year period. The responses to questions regarding the two-pool draw system and the group application system appeared to corroborate the hypotheses that these hunters were less satisfied with the frequency at which they received adult moose tags ($p < 0.05$). Although, in principle, hunters agreed that pool draws were good, they were not satisfied with the way the two-pool system was working. Part of the explanation may be that the system was confusing to hunters. The survey responses indicated that only about 25% of all moose hunters actually attended moose hunter seminars. There can be up to 16 steps in the two-pool draw allocation process, and even though hunters are provided with a large number of information brochures, courses, pamphlets, and booklets, all of these sources require time and a certain level of knowledge in order to be completely understood.

Hunters strongly agreed that hunting regulations should apply equally to all hunters ($\bar{x} = 4.8$). They did not, however, agree that this was the case for all Ontario hunters ($\bar{x} = 2.5$).

In Ontario, "distributive need" is recognized by giving Treaty Indians a legal precedence over other consumptive-users. They are generally permitted to hunt any time of year and do not require tags to hunt moose. Many respondents indicated dissatisfaction that natives could harvest moose without abiding by the same regulations that applied to all other Ontario hunters.

Members of sportsman organizations, such as the OFAH and local gun clubs, were significantly less likely to agree that the hunting regulations were applied equally to all hunters. These hunters generally placed greater importance on companionship than did hunters who were not affiliated with any organization. Therefore, they may have had more exposure to negative comments and concerns by hunters whom they encountered at club meetings or during the hunt, leading possibly to more negative impressions. Hunters agreed that they complied with regulations that were fair ($\bar{x} = 4.1$) and enforced ($\bar{x} = 3.4$). They viewed enforcement as less important than fairness, perhaps, because hunters recognised that regulations helped to conserve the moose resource ($\bar{x} = 4.0$), and that the moose resource would suffer without hunter cooperation ($\bar{x} = 4.7$). Hunters indicated that perceived dissatisfaction with the Selective Harvest System ($\bar{x} = 3.5$) and the adult moose tag allocation system ($\bar{x} = 3.4$) could lead to non-compliance with regulations. Since 67% of respondents indicated that dissatisfied hunters were most likely to complain to their friends. Only 39% of the respondents believed that dissatisfied hunters complained to the OMNR. Hunters, who may be satisfied that the moose management system works for them, may not support it because they know of many of their friends who are not satisfied with the fairness of the system. Word-of-mouth can be a powerful form of advertising and it may be important to facilitate the collection of hunters' negative and positive comments at OMNR offices, rather than have these hunters complaining to their friends and wildlife organizations.

Approximately 75% (2,840) of the hunters surveyed were between the ages of 31 and 60 years. Therefore, most hunters were likely to have hunted prior to the implementation of the Selective Harvest System and quotas. Many respondents expressed on the questionnaires a desire to return to a multiple tag system, for example, two tags for a bull moose and four tags for a cow. For a few years before selective harvesting was implemented a 2-tag system was used, but every hunter had a tag. The system had no conservation value for limiting kills. The fact that hunters still perceive that it is a better system indicates a failure to educate them.

Older hunters were more conservation oriented and more likely to agree with con-

servation measures, such as mandatory harvest reports ($\bar{x}$ = 3.9 versus all ages $\bar{x}$ = 3.7), perhaps because the actual harvest of moose is less important for them than experiencing companionship. Meanwhile, younger hunters rated meat and getting away from stress as primary motivators for them to go hunting. Middle-aged hunters (31 to 60 years of age) comprised the majority of OFAH members in the survey. Their affiliation with this wildlife organization may be explained by the comradery and companionship it provides. Only 597 (30%) respondents had attended a moose hunter seminar. Crosstabulation indicated that members of the OFAH and other local hunting and trapping organisations were more aware that moose seminars had been available in their region (p = 0.001).

Hunters who travelled greater distances (>900 km) to hunt were more satisfied with the interval at which they received meat ($\bar{x}$ = 3.3 versus overall $\bar{x}$ = 2.8), perhaps because they place less importance on moose meat to supplement their diets. Hunters who lived close to their WMUs (<300 km) spent more days moose hunting and appeared to be less satisfied with the fairness of the group application system ($\bar{x}$ = 2.4 versus overall $\bar{x}$ = 2.6) and the two-pool draw ($\bar{x}$ = 2.5 versus overall $\bar{x}$ = 2.7). These numbers may demonstrate the motivational differences between hunters from the north versus the south.

MANAGEMENT IMPLICATIONS

Dissatisfaction with the group application system and the two-pool lottery draw may stem from some historical facts. Pressure for tags when the system was designed was lower than it is today and success per tag afield was much lower. As managers struggled to meet targets for population growth they further constrained the number of tags issued. Today, the two-pool lottery is not a good fit to the goal of equal distribution across years of the limited resource; an excessive number of hunters accumulate in the pool 1 random draw. Hunters were given the impression that the average success rate with the lottery system would be one adult tag every two years, and hunters expect this statistic to hold true (Buss and Truman 1990), especially in the northern regions of the province where human population is relatively low. To further complicate the allocation system, the group application system requires hunters to have strategies in order to obtain tags repeatedly. In WMUs with high hunter to tag ratios, even these strategies fail because hunters would have to apply in very large groups (up to 26) in order to hunt for adult moose.

Low support for the OMNR may create problems in implementing management programs. If hunters had effective ways of registering complaints for incorporation into future management decisions, rather than complaining to their friends, then support for management programs might increase. With increased communication, positive and proactive changes could be incorporated into management strategies.

ACKNOWLEDGEMENTS

We would like to extend our thanks to Howard Smith of the Wildlife Policy Branch for providing funds to allow for a mailout of this magnitude, John Barbowski at the OMNR for making the OMNR hunter data available for this study. Constructive criticism for the questionnaire was received from numerous reviewers, but special thanks to Ed Reid of the OFAH and Al Bisset of the Kenora OMNR. Lastly, our appreciation is extended to all hunters who took the time to complete the questionnaire and in many instances wrote letters, notes, and helpful comments.

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