HUNTER EFFORT AND OBSERVATIONS - THE POTENTIAL FOR MONITORING TRENDS OF MOOSE POPULATIONS -A REVIEW

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ABSTRACT: The use of hunter effort and observations for monitoring the trends of North American moose populations by different management agencies is briefly reviewed. The pros and cons of each alternative are discussed. These parameters have the potential to generate trend information which may be useful to managers but should be used in association with others. Consistency in collecting the data must be ensured to make comparisons valid.

ALCES VOL. 29 (1993) pp.181-185

It has been suggested (Crichton 1987) that moose managers must search for additional parameters to assist in monitoring moose populations. The need for this is essential due to the current lack of funding to conduct traditional monitoring techniques. Crichton (1992) recommended 12 parameters for consideration in managing moose populations. He further stated that in the interest of maintaining long term monitoring programs, the parameters used should be simple, stable and cost effective. These are more likely to be used by managers. Monitoring programs should be directed at those parameters which will be leading indicators of future trends in moose populations. This paper reviews the potential use of hunter effort and observation data to assist in monitoring moose population trends and briefly discusses the pros and cons of each.

METHODS

Selected moose management agencies throughout North America were contacted and asked the following questions:

1: Do you employ hunter effort as a tool for monitoring moose population welfare? Do you have comments on the validity of this technique?
2: Do you use observations of moose by hunters or the general public as a means of monitoring the status of moose populations? Do you have comments on the validity of this technique?

RESULTS/DISCUSSION

All responses were categorized in either the yes or no category. Some agencies were somewhat ambivalent in their response. Those indicating they were at least looking at use of such data were included in the yes category (Table 1).

Agencies using hunter effort data did so in association with percent hunter success and treated the results as a trend. Effort was measured as days hunted/successful hunter or a parameter similar to this ie. days/animal. Some believe that days hunted/successful

Table 1. Moose management agency use of hunter effort and observations to assist in monitoring moose populations, 1993.

No. of agencies contacted	Hunter Effort/Success		Observations	
	Yes	No	Yes	No
15	12	3	12	3

hunter gives the strongest correlation to populations but recognized that they are nothing more than trends.

Newfoundland is of the opinion that hunter effort is a useful tool to ascertain whether populations are increasing, decreasing or remaining stationary (Mercer and Manual 1974, Curnew pers. comm.).

Alberta uses success and effort (days/animal) data for various management units in their ongoing management program (G. Lynch pers. comm.) Managers report that when success remains high it does so only because the corresponding effort has also increased. From a management perspective, Alberta uses success data in calculating the number of permits available annually for hunts where licenses are issued via a draw.

In Saskatchewan, effort and success are used along with historical data to ascertain changes in population trends (R. Beaulieu pers. comm.). Again, this information is treated as a trend.

In Manitoba, hunter effort and success are examined in some game hunting areas along with other factors (eg. population survey data, uncontrolled harvest, disease) and considered as population trend indicators (Crichton pers. comm.).

Both hunter success and effort are used in British Columbia as a means of ascertaining population trends and relative abundance in open season management areas as well as in limited area hunts (Childs pers. comm.). In addition, this information is also used to monitor the social success of hunting.

Hunter success is currently near 100% in Maine and hunters commonly see many moose during their hunt. As a result, managers are not confident that hunter effort data serve as a useful tool for monitoring the status of the herd (Morris pers. comm.).

Hunter effort is used in Nova Scotia but must be tempered with knowledge of the non licensed hunting mortality as well as density changes resulting from habitat disturbance ie. logging (Nette pers. comm.)

Hunter Effort

Hunter effort data have been used infrequently in Ontario even though the information is collected annually (Timmermann pers. comm.). Both success rate and overall harvest trends are examined. Timmermann *et al.* (1993) calculated a linear regression equation and found that harvest data estimated the population within the confidence intervals 50% of the time. It is now necessary to ascertain if this level of confidence is acceptable and if wrong decisions are made, based on these data, could there be long term negative implications to herd welfare? I suggest that with low density populations it could but this is contingent upon other parameters such as number of tags issued and age/sex restrictions.

In the Yukon, hunter effort is not used as managers deal with both low density populations and hunter numbers and contend that success rate and effort data would not be valid as a means of monitoring the status of populations or population change (Larsen pers. comm.).

Crête *et al.* (1981) and Crête and Dussault (1987) found that moose density in Quebec was inversely related to harvest effort and positively related to harvest per 10km^2. Effort is expressed as days/hunter/moose which in turn is converted into density in some management areas. A decrease in the harvest effort and an increase in the harvest per 10km^2 were both associated with an increased density. When effort is expressed as the percentage of hunters who made a kill this parameter is less sensitive. Presently, it is used in game reserves where the hunt is controlled. Crête and Dussault (1987) did not find any additional hunting statistics ie. sex ratio expressed as the proportion of males in the harvest, percentage of males in the harvest, number of calves per 100 females over two years old, percentage of milking females among females

over two years old and mean age of bulls and cows, which were related to density.

In summary, hunter effort, has the potential to generate trend information which may be useful to managers. But, it is essential to understand and/or have an appreciation of those factors which directly and indirectly influence hunter effort. For example, the comparisons in order to be valid must be made between similar seasons ie. calling season, post calling and winter. Weather can impact hunter effort as can vehicle restrictions. Roads have an impact especially those accessing formerly remote areas - in such cases, success may go up and effort down. Changes in harvest strategy can also impact success and effort data. In the early 1980's, Manitoba changed from any moose winter seasons to bull only and I found that this had a major impact on success and effort by those hunting in this time period. The number of hunters/tag can impact success and effort. In Manitoba, I found that as party size increased beyond 2 there was a dramatic increase in party success rate. The larger the party, the greater the chance of taking an animal. Overall, larger parties translate into more overall effort and a greater chance of overall success.

Managers must, when making valid comparisons, ensure consistency in how the data being used were collected and have first hand knowledge of those parameters which impact data quality.

Observations

This parameter is used as a trend in Newfoundland and expressed as moose seen/ hunter day (Curnew pers. comm). The number of calves observed has also been documented and followed over many years and treated as a trend. The crucial management question which needs addressing in further assessment of observations is what does a 2% or 5% rise (or decrease) in annual observations equate to in terms of overall population change.

Alberta uses observations in an indirect manner (Lynch pers. comm.). A usable program is not in place but when public complaints are received about specific management practices the issue is examined. Such concerns are examined along with other information sources such as the views of staff and survey data to help assess their validity. In one scenario in northwest Alberta (Lynch pers. comm.), hunter success maintained itself at about 20% but, hunters complained about the number of bulls being seen. District staff corroborated these concerns resulting in a re-emphasis on moose management in this portion of the province.

In Saskatchewan, managers tried to use sightings and developed a detailed "co-operative wildlife management study" form to be used by selected observers (Beaulieu pers. comm.). The form included a number of parameters such as adult male, female and calves along with antler configuration. Sample sizes were sufficient for deer but there was a paucity of moose sightings documented and as a result the data could not be used. Saskatchewan has many observers involved in the program but do not use hunter generated information.

In Manitoba, I developed a compact observation card for use by field staff in the late 1970's and management staff were asked to document all sightings during the antler period ie. May-December. The primary problem encountered was similar to that reported by Saskatchewan, namely, observations were not large enough to yield useable trend information for game hunting areas.

British Columbia moose managers introduced the hunter observation concept with the selective harvesting system in 1981. Those successful in draw areas were issued special moose observation booklets and asked to record the number of bulls, cows, calves and large antlered bulls observed. It was hoped that this information would enable managers to identify changes in the bull cow ratio over time. To date the data have not been analyzed

to determine its applicability.

Ontario has looked at sighting information as a long term data set. Analysis suggests that as managers reduce the number of tags and as hunters decrease they report seeing more moose (Timmermann pers. comm.) The percentage of calves seems most sensitive to changes related to density.

New Hampshire commenced using sightability data in 1992 and are now embarking on a diary card system (Bontaites pers. comm.). To date, 5,000 have been sent out to deer hunters but the response has been poor.

Managers in the Northwest Territories, when attending wildlife meetings in the respective native communities obtain information from community members indicating that they are seeing less, more or about the same number of moose (Graf pers. comm.) Often, when the collective sightings are down, the local community will voluntarily reduce their harvest accordingly.

Some agencies collect observations through voluntary or mandatory questionnaires and hunters are asked to document the number of males, females and calves seen. Some of the problems encountered include changes in season dates making interpretation of these data difficult. The number of observations can also be impacted by season length. In high density areas with a high hunter success and a season 6 days long ie. Maine, many hunters take an animal in 2 days or less resulting in few observations because of the short time in the field (Morrison pers. comm.). The presence of leaves on trees during the early fall hunting seasons may impact sightability but it usually improves following leaf fall.

Some management agencies generate sightings from deer and moose hunter surveys and when a couple of indices point in one direction this is then used as a population trend. In other agencies, hunter sightings are collected but do not currently fit into any moose population analyses. Some suggest that sightings mean little especially when large numbers of animals are seen (Morrison pers. comm.) while others suggest that this is a reflection of herd status.

Many factors can affect observation data including the following:

1: weather.
2: hunting season timing if hunters are the source of the data.
3: numbers of hunters in the field.
4: uncontrolled harvest ie. poaching and aboriginal use.
5: new access.
6: hunter recall and questionnaire timing.
7: habitat conditions ie. recently cut areas, immature vs mature vs overmature.
8: moose density.
9: quantity and quality of data.

Observation data are best used as a trend indicator along with other factors such as percent success and size of the harvest to help assess the status of populations.

Small sample sizes are a problem in many jurisdictions when comparing results on a year to year basis. As hunters make up only about 10 percent of the public in North America consideration should be given to involving nonhunters. Examples might include rural mail carriers, lodges catering to fishermen, truck drivers etc..

The following guidelines are suggested to assist in collecting quality observationl data.

1: Obtain sample sizes which are large enough for statistical analysis and representative of the area of concern.
2: Carefully lay out the specific observations requested in a clear and concise manner to obtain the most value from the data set being collected.
3: Communicate with others who have used similar techniques for moose or for other species to learn which pitfalls should be avoided.
4: Consider several parameters which are independent of each other to assist in indirectly monitoring the status of populations.

Hunter effort and hunter sightings of moose are not independent variables as there are a number of similar factors which can impact each. Sources for these data are hunters, game and fish clubs, assorted outdoor enthusiasts, management agency staff etc..

General

During these current times of fiscal restraint, managers will, by necessity, have to do more with less and become more innovative in attempting to measure population welfare. In the past many management agencies have collected much data which has not been fully analyzed. I suggest it is imperative to re-examine in detail that which has been collected, ascertain how it has been used, and what minimum information is needed to conduct credible management programs. Statisticians should be consulted as well as our peers to ascertain the quantity and quality of data required. In addition, the public needs to be better informed regarding the objectives and costs of carrying out professional management programs and the need for their involvement. Both the resource and recreational use activities will benefit from these initiatives.

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