MOOSE HUNTING OPPORTUNITIES FOR PHYSICALLY-CHALLENGED HUNTERS IN ONTARIO: A PILOT STUDY

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ABSTRACT: A 7-year pilot study was conducted in Wildlife Management Unit (WMU) 11B in northwestern Ontario to increase moose (*Alces alces)* hunting opportunities for physically-challenged hunters by providing an early fall gun season. The definition of a physically-challenged hunter was a person with permanent impairment of the lower limbs that limited movement to wheelchair use only. Each physically-challenged hunter was allowed to use an assistant to assist with tracking, field-dressing, and dispatching a wounded animal. Participants were required to participate in the regular adult validation tag draw system to obtain an adult tag or to hunt for calves only. Up to 10 physically-challenged hunters participated in the hunt each year. No more than 2 moose were harvested during the early season in any year. The program was well received by local hunters, but attracted very few hunters from outside of the vicinity. There was considerable interest in broadening the program both geographically and by the definition of physical disability. Implications of such an expansion are discussed.

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There is increasing interest in providing outdoor recreational opportunities for physically-challenged people across North America (Meyerson 1996). In the United States, this trend has been encouraged through legislation such as the "Americans with Disabilities Act" which "required accessibility in all employment programs, all state and governmental programs and in all places of public accommodation whether or not federal funds were involved", which has been interpreted to include places of recreation (Park and Robb 1996). In Canada, there is no such broad legislation, and opportunities for physically-challenged participants have generally been provided in response to societal trends rather than legal requirements. Hunting is an appealing and challenging type of outdoor recreation for many physically disabled persons (Winkel 1988, Roseberry 1990, Wray 1990). A number of jurisdictions across Canada have attempted to improve outdoor recreational opportunities for physically-challenged anglers and hunters through complimentary fishing licenses, wheelchair accessible fishing ramps, and authorizing physically-challenged hunters to discharge firearms from vehicles.

Moose harvest in Ontario is managed through a province-wide sex and age selective harvest strategy (Timmermann and Whitlaw 1992). A local group of physically-challenged gun hunters, with the support of the local office of the Canadian Paraplegic Association (CPA), proposed a special early moose hunting season in the Thunder Bay area to the Ontario Ministry of Natural Resources (OMNR). The proposed early hunting season would allow these hunters to avoid the inclement weather conditions often experienced during the regular gun season, and reduce competition and congestion from hunters who were not physically-chal-

lenged. This paper describes the development and implementation of this early gun season, a number of issues that were considered and addressed during the process, and implications for a broader program. This paper will address the approach involved in developing the proposal for this special season in partnership with a number of interested organizations and individuals, as well as the results of the specific pilot study that was undertaken to assess the feasibility of an early season for physically-challenged hunters.

The objectives of this project were threefold: (1) to provide an improved hunting opportunity for physically-challenged (mobility-impaired) gun hunters who are confined to wheelchairs and experience physical difficulty hunting during the regular gun season; (2) to evaluate the feasibility of a special big game hunting season for physically-challenged hunters; and (3) to encourage the participation of these hunters in big game hunting.

HISTORICAL BACKGROUND

The CPA and the OMNR placed a number of public notices in local media and issued news releases, to describe the proposal and seek public comment. An advisory committee was established, comprised of representatives of physically-challenged hunters, archery hunters, gun hunters, hunter safety instructors, and the OMNR. This committee met throughout the developmental and implementation stages of the project to identify and address issues as they were raised. Resolution of these issues led to the final proposal for a special hunting season which was implemented. An annual evaluation meeting with the advisory committee was also held after the hunting season.

The project was originally designed as a 3-year pilot study (1992-94). Hunters were advised of the opportunity associated with this special hunt for physically-challenged hunters by news releases, the annual hunting regulations summary, and by information disseminated by the partner groups and associations. Physically-challenged hunters applied directly to the local OMNR office to participate in the program. Participants were required to report the number of days hunted and hunt success. After completion of the pilot study period, the mandatory reporting of hunt participation and success was dropped and some later information is therefore lacking. Information has been included where available for all years between 1992 and 1998.

A number of Canadian provinces and the states of Wisconsin and Minnesota adjacent to northwestern Ontario were contacted in 1992 to determine opportunities that were available to physically-challenged hunters, and to determine if any agency had special seasons similar to that being considered in Ontario. This was not a comprehensive or complete survey of all jurisdictions.

PROGRAM IMPLEMENTATION

Location of the Pilot Program

Wildlife Management Unit (WMU) 11B, west of Thunder Bay, east of Atikokan, and directly east of Quetico Provincial Park was chosen for the pilot program. This WMU was chosen for several reasons: (1) it is relatively close to Thunder Bay, with good access; (2) there is no early archery season, thus avoiding any safety or competitive concerns with archery hunters; (3) it contained an accommodation facility for the physically-challenged; and (4) it contained a relatively high density moose population, providing a reasonable opportunity for physically-challenged hunters to see and harvest moose. WMU 11B has a good road network, with major road corridors running both east-west and north-south. This WMU is relatively small at 1,575 km^2 in size, and had a relatively high moose density of 0.39 moose/ km^2 as estimated during the 1996-97

aerial moose inventory (Bisset *et al.* 1997). The moose density in WMU 11B had increased progressively over 4 aerial inventories conducted between 1984 and 1993, and then declined from 0.52 moose/ km^2 in 1993 to the 1996-97 level (Whitlaw *et al.* 1993, Bisset *et al.* 1997). This WMU is located in the transition forest between the Great Lakes-St Lawrence and the boreal forest regions (Rowe 1972). During the 1992-96 period, moose hunting pressure averaged 3,905 hunter days per season (3-year average from 1992, 1994, and 1995 provincial mail surveys, OMNR file data). A summary of the number of adult moose validation tags, and the number of hunters applying, is listed in Table 1.

Definition of a Physically-challenged Hunter

There are many different criteria for physical disability. Few seemed to fit the specific rationale accepted as the basis for considering an early hunting season; i.e., the poor circulation that often accompanies lower limb impairments, reducing hunters' ability to be outdoors during colder weather. At Atikokan, the closest community with climatic information, average monthly parameters vary between September and October as follows: daily mean temperature 10.6°C - 4.5°C, daily minimum temperature 4.4°C - -0.5°C, and average snowfall 2.1 - 12.6 cm respectively (1961-1990 climate normals, Environment Canada, Canadian Meteorological Centre). Some proponents advocated a very broad definition of physical disability such as that used to provide special parking permits for drivers, i.e. "anyone who is unable to walk unassisted more than 200 metres (218 yds.) without serious difficulty or danger to safety or health" (Government of Ontario 1991). Physically-challenged persons in Ontario are not required to purchase a resident fishing licence if they are eligible for and possess either a Canadian National Institute for the Blind National Identity Card, or a Ministry of Transportation disabled person parking permit (Government of Ontario 1998). Physically-challenged hunters can also be authorized to discharge a firearm from a stationary motor vehicle (Government of Ontario 1983). The above definitions encompass many hunters who do not have a specific disability limiting their ability to be active in colder weather. The definition that was found to be most appropriate was that developed by the International Paralympic Games organization to define the minimal disability for players in wheelchair basketball; i.e., "...must possess a permanent physical impairment of the lower limbs, which must be objective and ratified by diverse medical or paramedical investigation such as measurement, radiography, scanner testing, etc. ..." (Paralympic Games 1992). Medical certification that an individual met these criteria was required. Using this definition limited eligibility to wheelchair-confined hunters; these were the physically-challenged hunters that were most

Table 1. Number of adult moose validation tags and number of hunters applying for them during the 1992-97 pilot study in WMU 11B, Ontario, Canada.

Year	No. available moose adult validation tags	No. hunters applying for adult validation tags[1]
1992	180	427 (2.37)[2]
1993	290	518 (1.79)
1994	290	531 (1.83)
1995	290	590 (2.03)
1996	290	647 (2.23)
1997	180	656 (3.64)
Average	253.3	501.3 (2.22)

[1]First choice, preferred and non-preferred pools combined

[2]Hunter: tag ratio

susceptible to the often cold hunting conditions experienced during the regular gun season. Although hunters received permits to discharge firearms from motor vehicles, their hunting was not restricted to vehicles.

Season Timing and Potential Conflicts with the Archery Season

The regular gun season in Ontario opens on the Saturday closest to October 8 annually. Many WMUs in northwestern Ontario have both an archery and a gun season in place for moose, with the archery season occurring during the 3 weeks preceding the gun season. The early fall gun season for physically-challenged hunters was designated to begin 3 weeks earlier, on the Saturday closest to September 17 annually. This season overlapped completely with the archery seasons occurring in many WMUs. Archers were concerned about the potential for conflict and accidents between the 2 types of hunting, as archers typically dress in camouflage clothing and often call for moose from hidden sites located near bush roads. WMU 11B was designated as the pilot program site in part because it was the only WMU close to Thunder Bay which didn't have an early archery season.

The Need for an Assistant

By definition, physically-challenged hunters had major mobility impairments that limited their ability to track and dispatch a wounded animal, field dress a harvested animal, and carry it out to a vehicle, and they required assistance with these tasks. The Ontario Game and Fish Act defines hunting to include "chasing, pursuing, following after or on the trail of, searching for, shooting, shooting at, stalking or lying in wait for, worrying, molesting, taking or destroying any animal or bird..." (Government of Ontario 1983). Any assistant who would be involved in retrieving, tracking, or dispatching a moose would be considered to be hunting and would have to be appropriately licensed. Physically-challenged hunters were allowed to designate 1 or more assistants who would be in the field with them. Assistants were authorized to carry and use the hunter's high-powered rifle if a moose was wounded and moved off-site (appropriate federal firearms permits were required). However, they could not actively participate in the hunt by calling or driving moose, nor could they possess their own high-powered rifle.

The Demand for a Special Moose Tag Allocation

Advocates of this special early moose hunting season proposed a specific allocation of adult validation tags to physically-challenged hunters who met the eligibility criteria. This would have guaranteed a small number of tags for those qualified hunters who applied. Even though it would have been a relatively small number of tags, the tags would have had to be removed from the existing validation tag allocation for the regular gun season. This was not considered appropriate because this is a small WMU with a relatively small number of tags available, high hunter interest, and a lower tag:applicant ratio than most neighboring WMUs. Given these factors, and recognizing the experimental nature of the pilot project, the decision was made that no special tag allocation would be made. Instead, physically-challenged hunters could apply in the selective harvest draw system with all other hunters, and those who received an adult validation tag would have the opportunity to have this tag validated for use in the early season only. Eligible hunters who did not receive an adult validation tag for WMU 11B in the selective harvest system, including those who may not have applied specifically for this WMU, had the opportunity to receive authorization to hunt for calves only during the early season.

Hunters were still limited to sealing 1 harvested moose annually.

Scale of the Pilot Project

Proponents of an early fall hunting season for physically-challenged hunters had proposed that this season be implemented in several WMUs to provide maximum and equal opportunities to eligible hunters across the province. However, it was felt that a pilot project in 1 specific WMU was appropriate for several reasons: (1) this was a new type of hunting opportunity that did not appear to have been implemented elsewhere in North America; (2) this would help to determine the feasibility of the approach, and allow the identification and resolution of any difficulties on a site-specific basis; (3) physically-challenged hunters from other areas would have equal opportunity to participate in the hunt, although they would have to travel farther; and (4) without some indication of the demand for special opportunities for physically-challenged hunters, considerable administrative time and effort could be expended towards establishing several special seasons which might receive little or no interest from the hunting public.

Number of Hunters Permitted

Given the new nature of this project, and the lack of a reliable estimate of the number of eligible hunters who might be interested in participating, the number of permits that would be issued in any 1 year was limited to 25. First preference was accorded to holders of an adult validation tag for WMU 11B. Remaining permits were issued on a random basis to applicants with a valid moose license. This limitation was placed on the number of permits because it was expected that hunters from elsewhere in the province might apply, and there was concern about possible large increases in the number of moose tag applicants for this relatively small WMU.

Data Collection

All participants were required to complete a survey detailing their participation, hunting effort, and success during this special early season. Participants who failed to complete a questionnaire were ineligible to participate in the special early season in a subsequent year. Assistants to physically-challenged hunters were not surveyed.

Public Comment

Public comment was generally favorable. Most concerns raised related to the potential safety issue of an archery season and a gun season occurring in the same WMU at the same time, and to restricting the definition of physical disability to those most in need of such an early season (i.e., support for a more restricted rather than a more liberal definition). A number of suggested modifications or alternatives to the program were received and evaluated.

Levels of Participation and Harvest Success

Application and participation rates were quite low in all years and increased only marginally during the pilot study, ranging from 4 - 10 participants plus assistants annually (Table 2). Interest was expressed from a larger number of hunters than those who applied. Hunters who lived some distance away from WMU 11B often asked if there was the opportunity for a similar season in their vicinity; many seemed unwilling to travel long distances. It appeared that most participants were already active big game hunters, rather than hunters who may have been encouraged to try big game hunting because of the special season. Participants were most successful in harvesting calves, then bulls, then cows. The proportion of successful hunters ranged from 0 out

of 10 to 2 out of 4 hunters (Table 2).

Planning, Implementation, and Enforcement Details

The original proposal was received in the spring of 1990, starting a 2-year process leading to the implementation of the first early moose season for physically-challenged hunters in the fall of 1992. Costs for implementation of the pilot study were relatively low, although a substantial commitment of staff time was required. Additional enforcement effort was not directed towards this special early season because small game and black bear (*Ursus americanus*) seasons were open at the same time, and routine enforcement patrols were in place. No violations were encountered with regard to any aspect of the special early season.

Survey of Other Jurisdictions

Most Canadian jurisdictions surveyed provide authorization for mobility-impaired hunters to discharge a firearm from a stationary motorized vehicle (Table 3). Although this practice is otherwise considered illegal and unsafe, this accommodation for physically disabled persons has been made to expand recreational opportunities to a broader segment of the public (Timmermann and Buss 1998). When this project was initiated in 1992 there were no known examples of special hunting seasons for physically-challenged hunters in Canada, while US jurisdictions were establishing special seasons to provide hunting opportunities in areas otherwise closed to hunting. Several jurisdictions also allowed the use of motorized vehicles in areas otherwise closed to vehicle use.

DISCUSSION

Considerable effort has been expended across North America to improve the accessibility of hunting opportunities to physically-challenged hunters. A wide variety of approaches have been implemented. These approaches include authorization to possess and discharge a loaded firearm from a stationary motorized vehicle, authorization to travel on roads otherwise closed to motor vehicles, the lifting of special archery gear restrictions, and the construction of special

Table 2. Participation and success rate of physically-challenged hunters in the special early moose season in WMU 11B, Ontario, Canada[1].

Year	No. participants[2]	No. moose harvested	Age & sex of harvested moose	% success
1992	5	2	2 calves	40
1993	6	2	1 bull, 1 cow	33
1994	8	1	1 bull	13
1995	8	1	1 bull	13
1996	4	unknown	unknown	unknown
1997	10	0	n/a	0
1998	4	2	2 calves	50
Average	6.4	1.3		20.7

[1]Complete data not collected after 1995 (completion of original pilot study period)

[2]Maximum of 25 participants allowed

Table 3. Results of a 1992 survey of special opportunities provided for physically-challenged hunters in selected states and provinces[1].

Special opportunities for physically-challenged hunters in 1992	AB	BC	NB	MB	PQ	SK	MN	WI
No special seasons	X	X	X	X	X	X		
Special white-tailed deer seasons in specific areas							X	X
Special turkey seasons in some state parks								X
Authorization to discharge firearms from a vehicle	X[2]	X			X	X		
Exemption from minimum requirements for archery equipment	X							
Authorization to use off-road vehicles in areas where off-road use is restricted				X				
Authorization to use vehicles on closed roads								X

[1]Alberta (AB), British Columbia (BC), New Brunswick (NB), Manitoba (MB), Quebec (PQ), Saskatchewan (SK), Minnesota (MN), Wisconsin (WI)

[2]Off-highway vehicles

hunting blinds, shooting houses, platforms, and trails. Special hunting opportunities that have been implemented include white-tailed deer (*Odocoileus virginanus*) and turkey (*Maleagris gallopavo*) seasons in wildlife management areas or parks otherwise closed to hunting, and liberalized bag limits to allow either-sex hunting for deer (*Odocoileus* spp.) and elk (*Cervus elaphus)* (Wray 1990, T. Armstrong *unpubl. data*).

There appear to be no other examples of efforts to provide special hunting opportunities for big game species other than deer, or situations where physically-challenged hunters were given the opportunity for a separate season rather than an area-exclusive hunting opportunity. The new nature of this proposal highlighted the need for a cautious and thorough approach to planning. Much effort was expended to identify and address the major issues that arose during planning and implementation. The involvement of a wide spectrum of members of the hunting fraternity in addition to physically-challenged hunters, including archery hunters, hunter safety instructors, and gun hunters, was very helpful in identifying the issues and risks involved, reaching consensus on reasonable solutions, and building support. The involvement of a number of organizations dedicated to improving the cause of the physically-challenged also helped ensure an understanding of their needs and concerns. Gun hunters in general were very supportive of the proposal for special hunting opportunities for physically-challenged hunters (Wood 1991).

Despite the involvement of a large number of people in the planning and implementation of this pilot project, the actual participation rate was relatively low, averaging 6.4 hunters, or 1.2 % of the average number of hunters in WMU 11B during the 1995 and 1996 hunting seasons (provincial mail survey data, OMNR file data). Many factors are no doubt involved in this low participation rate. The number of physically-challenged hunters is a small proportion of the hunting population. While several inquiries were received from hunters in other parts of the province, these hunters

were more interested in obtaining a similar hunting season in the WMU near where they traditionally hunt than traveling to a new hunting area. Another factor may have been the relatively low probability of obtaining an adult validation tag (averaging 2.22 first choice applicants per available tag for 1992-97) which may have discouraged some eligible hunters from applying. The number of applicants in WMU 11B had increased immediately prior to this study as a result of the opening of a large area that had been closed to moose hunting, but dropped back to 1990 levels by 1992 (McMillan *et al.* 1995).

A small, separate tag allocation was not provided for qualified hunters in the early season because of concerns about potentially higher success rates and impacts on tags available for the regular draw. However, hunting moose in the peak of the rut did not appear to result in high harvest by physically-challenged hunters. Success rates were not higher during this special early season, averaging 21% as compared to 21% and 37% in the 1995 and 1996 regular gun seasons respectively (provincial mail survey, OMNR file data). Recent success rates for adult validation tag holders were higher, ranging from 30-50% for the regular gun hunt (Whitlaw *et al.* 1993, OMNR file data). The lack of any apparent increase in success rate during the early season, based upon the limited data available from this study, suggests that the increased vulnerability of moose during the rut (Crichton 1998) was in part compensated for by the mobility impairment of the early season hunters. It appears likely that a separate, small tag allocation for the early season would have had minimal effect on the total moose harvest within the WMU.

The restriction of this program to physically-challenged hunters who had a permanent lower limb disability that made them incapable of walking, limited the participation rate. The program was not intended to provide all physically-challenged hunters with an exclusive hunting period solely to avoid competition for space and moose with hunters in the regular gun season, but to address the specific inclement weather conditions faced by mobility-impaired hunters. Some people criticized the program for being too restrictive and not treating all physically-challenged persons equally.

Decisions on the broader application of such a program must consider a wide range of factors. A separate tag allocation would increase interest and participation. Providing similar hunting opportunities near a larger number of urban centres would no doubt increase the accessibility of this program to physically-challenged hunters, but would also require considerable administrative and enforcement effort for a low participation rate. A more liberal definition of a physically-challenged hunter would likely increase participation rate, but this would not be consistent with the original rationale for the early season. Allowing a greater number of hunters, many of whom would have greater mobility than those included in this study into the early season would probably increase moose harvest and success rates, thereby affecting overall tag allocations. The support of regular gun season hunters would probably decline if such a situation occurred.

Decisions on the continuation or expansion of such a program must consider far more than the participation rate. While participation was low, all participants involved in the program expressed satisfaction with the program and support for its continuation (G. Auld, Ont. Min. Nat. Resour., *pers. comm.*). As the program has developed, greater administrative assistance in running the program has been provided by the CPA, reducing the required involvement of OMNR staff and resources.

This program was relatively inexpensive to implement. Major costs were related to staff time devoted to meetings, public discussion, and addressing the major identified issues. Enforcement costs were also low, as routine enforcement patrols were already planned and occurring within the study area at that time. Assessment of this program was limited by both the low participation rate, and the limited information solicited from the participants. More detailed information should be sought from participants in future similar pilot projects on hunting effort, participant satisfaction, involvement of the assistants, vehicular use, the number and type of moose seen, and the number of moose shot at. Data collection should have been continued beyond the original pilot study period.

Comments received from some physically-challenged hunters during the initial public consultation associated with this project are worthy of further consideration. There were 2 suggestions for renewed efforts to integrate physically-challenged hunters into hunting parties in currently available hunting seasons, rather than efforts to create special opportunities. While there is merit in improving opportunities for physically-challenged hunters to participate in the hunt, exclusive seasons or areas designated solely for physically-challenged hunters limit their ability to interact with non-disabled hunters within a broader hunting environment. There is also the potential to over-emphasize moose harvest opportunities at the expense of the social aspects of moose hunting.

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REFERENCES

BISSET, A., M. McLAREN, C. EDMONDS, W. SAWYER, W. GLUHUSHKIN, K. MORRISON, and C. DAVIES. 1997. Report on the 1995-96 and 1996-97 moose population surveys: with considerations for future surveys. Ont. Min. Nat. Resour., Northwest Reg. Sci. Technol., Tech. Rep. TR-113. 20 pp.

CRICHTON, V. F. J. 1998. Hunting. Pages 617-653 *in* A. W. Franzmann and C. C. Schwartz (eds.) Ecology and management of the North American moose. Smithsonian Inst. Press, Washington, DC.

GOVERNMENT OF ONTARIO. 1983. Game and Fish Act. Chapter 182, Revised Statutes of Ontario (1980). Queen's Printer for Ontario, Toronto, ON. 35 pp.

_____. 1991. Highway Traffic Act. Vol. 5., Revised Statutes of Ontario (1990). Queen's Printer for Ontario, Toronto, ON. 164 pp.

_____. 1998. Ontario recreational fishing regulations summary. Ont. Min. Natur. Resour., Peterborough, ON. 59 pp.

MCMILLAN, L. M., G. D. RACEY, H. R. TIMMERMANN, and R. GOLLAT. 1995. Effects of hunting closures and timber harvest on local moose densities and hunting opportunities in northwestern Ontario: a case study. Ont. Min. Nat. Resour., Northwest Reg. Sci. Technol., Draft Rep. 54 pp.

MEYERSON, H. L. 1996. Getting access to the outdoors. Michigan Nat. Resour. Jan./Feb.:6 - 12.

PARALYMPIC GAMES. 1992. General and functional classification guide (original version). IX Paralympic Games Barcelona '92. Barcelona, Spain.

PARK, D. and G. M. ROBB. 1996. Outdoor recreation and access for people with disabilities: issues and trends. U.S. Dept. Interior, National Park Serv., Trends 33(1): 2-7.

ROSEBERRY, T., JR. 1990. Hunting is not handicapped. Virginia Wildl. 51: 22-25.

ROWE, J. S . 1972. Forest regions of Canada. Canadian Forest Serv., Publ. 1300. Ottawa, ON. 88 pp.

TIMMERMANN, H. A. and M. E. BUSS. 1998. Population and harvest management. Pages 559-615 *in* A. W. Franzmann and C. C. Schwartz (eds.) Ecology and management of the North American moose. Smithsonian Inst. Press, Washington, DC.

_____ and H. A. WHITLAW. 1992. Selective moose harvest in North Central Ontario - a progress report. Alces 28: 137-163.

WHITLAW, H. A., H. R. TIMMERMANN, P. PERNSKY, and A. R. BISSET. 1993. Northwest Region moose population and harvest profile. Ont. Min. Nat. Resour., Northwest Reg. Sci. Technol., Tech. Rep. TR-75. 129 pp.

WINKEL, M. 1988. Crossbows and the disabled hunter. Disabled Outdoors 2(4): 4-5.

WOOD, L. 1991. Review of the adult moose validation tag draw, Final Report June, 1991. Ont. Min. Nat. Resour., Toronto, ON. 36 pp.

WRAY, P. 1990. Hunting opportunities for physically disabled improving around state. Oregon Wildl. 46(6): 4-5.