

# Frequently Asked Questions: Moose Harvest Strategies in South-Central BC (Cariboo, Thompson, Okanagan, Kootenay, Omineca)

## Fish, Wildlife and Habitat Management Branch

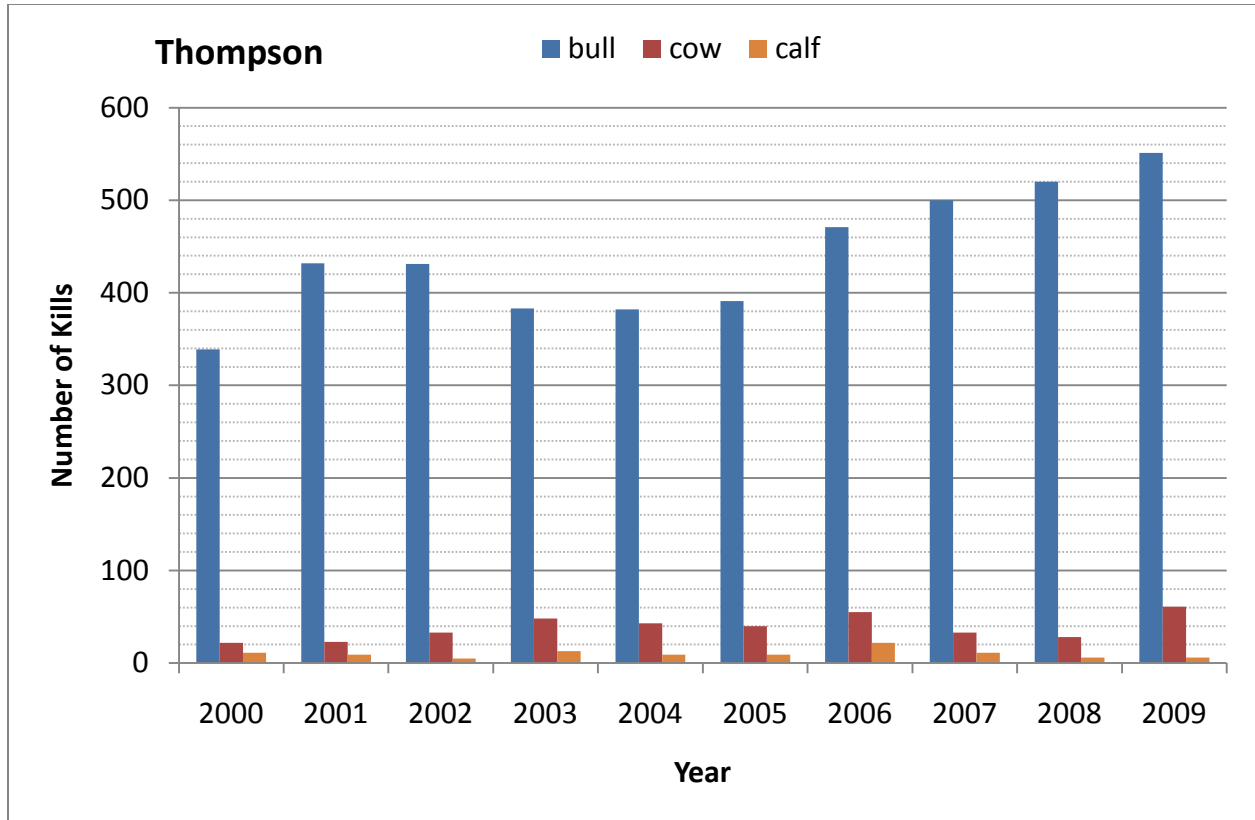
July 18, 2011

1. How many moose are in south-central BC and are they increasing, stable or declining? Where do these numbers come from?

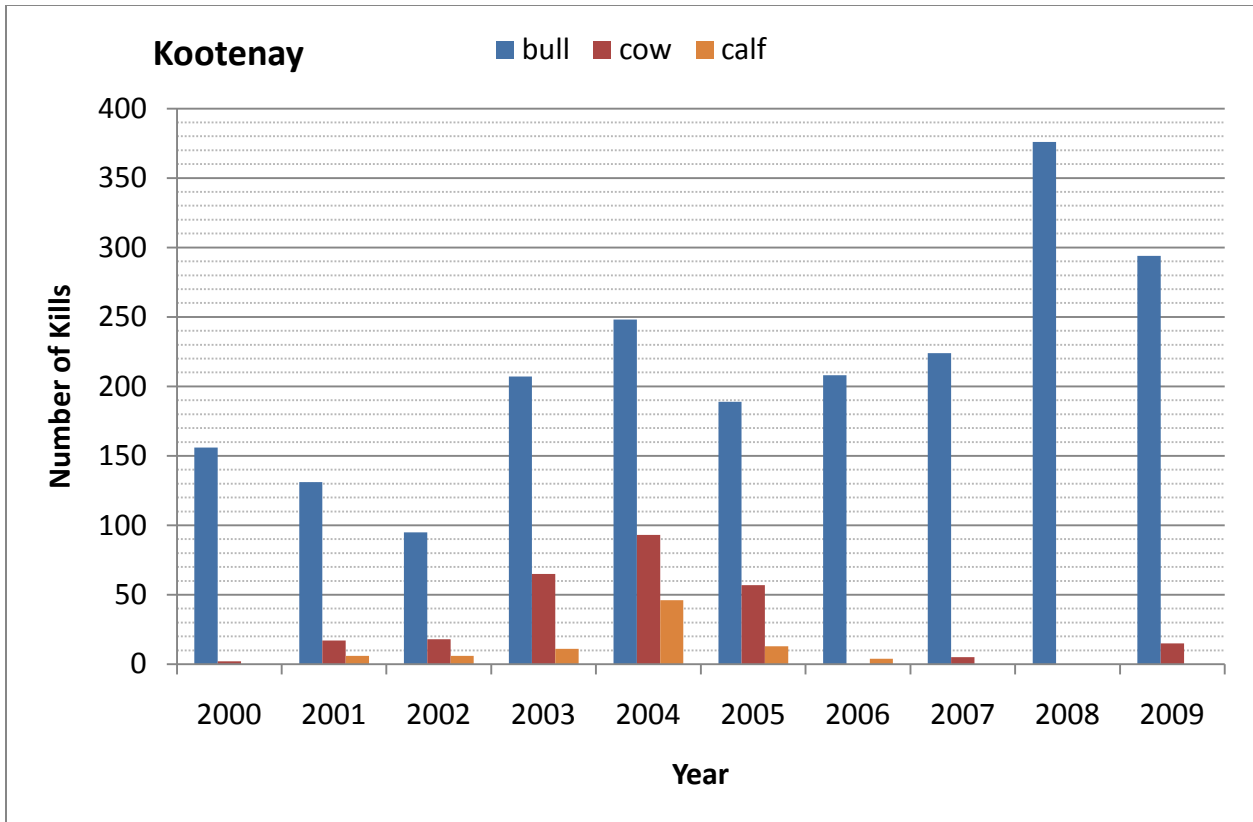
Region Name	Estimated Number of Moose
Thompson	8,000-12,000
Kootenay	7,000-9,000
Cariboo	20,000-28,000
Omineca	30,000-50,000
Okanagan	2,000-3,000

South-central BC is comprised of five regions, as identified in the Hunting and Trapping Regulations Synopsis and outlined in the table above. Estimates of moose numbers are provided by regional biologists every three years to enable an evaluation of population trend. The numbers in the above Table were produced in the summer of 2011. The trend in moose numbers over the last 10 years in south-central BC is thought to be generally stable to increasing. It is important to realise these numbers are based on a regional scale and that there may be local variation in population densities and trends.

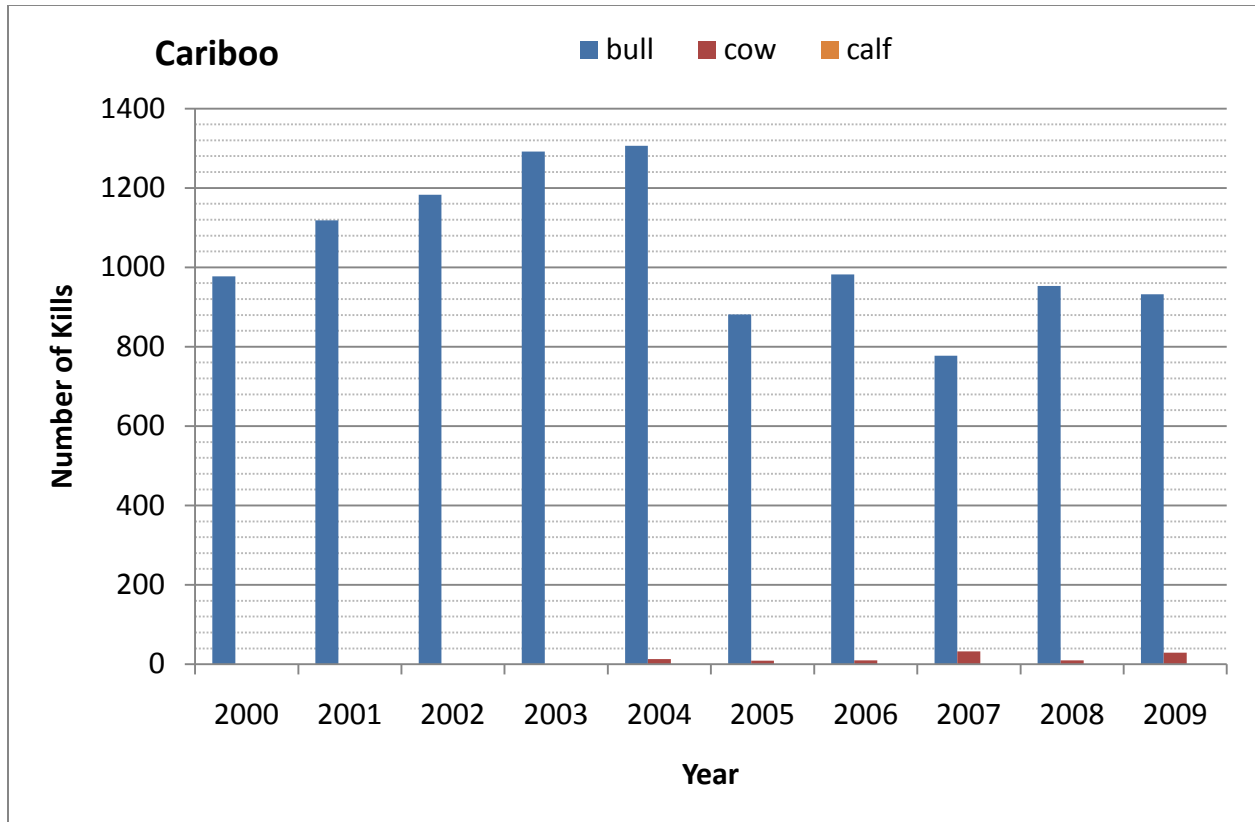
2. What has been the resident hunter harvest of bulls, cows, and calves over the last 10 years? What do those numbers and trends mean and what inferences do we draw from them?



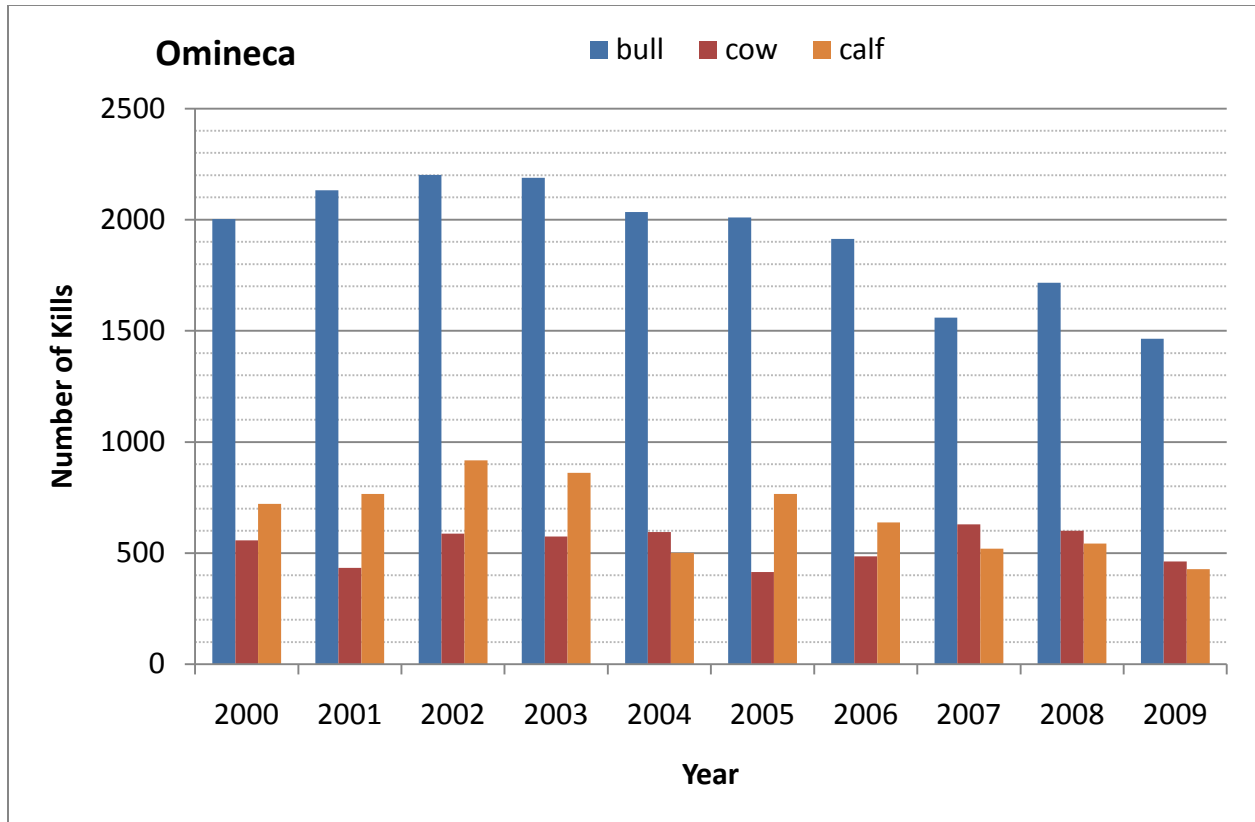
**Thompson** - The increasing trend in the bull harvest over the last 10 years appears to be a result of an increasing moose population and an increase in General Open Season (GOS) spike-fork hunter numbers and effort. The GOS spike-fork harvest has increased to approximately 50% of the total bull harvest. The increase in the spike-fork harvest is likely due to the creation of new access associated with salvage logging of beetle-killed pine forests. In order to maintain the spike-fork harvest at sustainable levels, the GOS spike-fork season was adjusted in 2010 to occur outside the rut when males are most vulnerable to hunting. Adult bulls and antlerless moose are harvested through Limited Entry Hunting (LEH). The increase in the antlerless harvest in more recent years is primarily due to an increase in LEH authorizations.



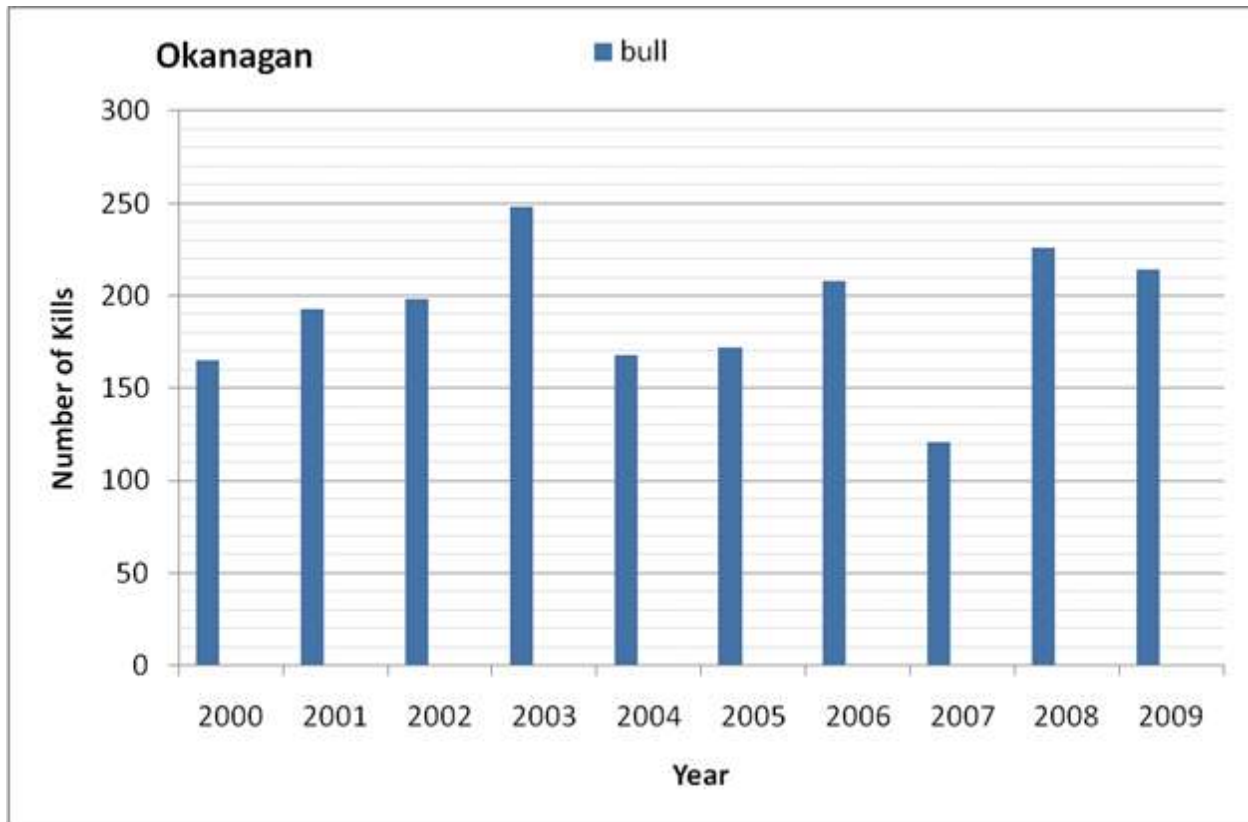
**Kootenay** - The bull harvest has generally increased over the past 10 years. This is, in part, due to increases in the population estimate and a corresponding increase in the number of LEH authorizations for bull moose. The Kootenay Region has antlerless LEH permits only in the Revelstoke area (MUs 4-38 and 4-39). These were issued with the intent of decreasing the population, and have fluctuated annually in response to new information on population size and trends in that area. A GOS spike-fork season was introduced in 2009.



**Cariboo** – The moose harvest increased from 2000 to 2004 and was lower, but stable, during the period from 2005 to 2009. The reduction in the harvest is a direct result of a revised regional population estimate and a lowering of the number of moose allocated for harvest to achieve the annual harvest target. All moose in the Cariboo are managed through LEH. The Cariboo Region has antlerless LEH permits only in the Quesnel Highland area (MU 5-15), where the intent has been to decrease the population. In order to achieve the annual allowable harvest (AAH), additional LEH authorizations are added to specific hunts. In addition, a significant number of authorizations have been shifted from late season to early season hunts in order to increase the success rate and allow hunters to achieve the AAH target.



**Omineca** - The bull and calf harvests have declined in recent years. The calf harvest in 2009 was the lowest recorded under the current (1981 – 2009) selective harvest strategy, but the bull harvest is still within the range of variation. The reasons for the decline in the bull and calf harvests are not known, but they do not appear to be related to the increase in salvage logging activities. The cow harvest and LEH permit numbers have not changed, suggesting that the cow harvest is sustainable and that the bull and calf harvest will increase in future years. The selective harvest strategy introduced in the Omineca in 1981 allows for the harvest of spike-fork and calf moose through a GOS, while mature moose and antlerless (cow or calf) are harvested through LEH.



**Okanagan** – The bull harvest has been variable over the past 10 years. There has been increasing hunter interest and success in harvesting spike-fork moose during the GOS in recent years. However, there are concerns about the current high spike-fork harvest and the pace of logging access to salvage beetle killed pine which has made moose more vulnerable to hunting. In order to maintain the spike-fork harvest at sustainable levels, the GOS spike-fork season was adjusted in 2010 to occur outside the rut when males are most vulnerable to hunting. The moose population in the Okanagan is small compared to other Regions and there are currently no licensed antlerless harvest opportunities.

3. What are the moose population objectives in south-central BC?

The Ministry provides guidance for regional moose population objectives in the Moose Harvest Management Procedure. The procedure states that unless formal population management objectives have been identified in a region, hunted moose populations will be managed to avoid declines and to ensure that the post-hunt bull:cow ratio remains above 30 bulls:100 cows. For low density moose populations (< 200/1000 km<sup>2</sup> of fall range), a minimum ratio of 50 bulls:100 cows is preferred. Formal population management objectives may be based on a desired bull:cow ratio (e.g. an adult sex ratio above the minimum, such as 40 bulls:100 cows), a desired calf:cow ratio and a desired population density. These formal objectives also consider First Nation needs, land use commitments, and broader ecosystem initiatives such as species at risk conservation.

4. What are the acceptable harvest rates for moose? How are other human-caused moose mortalities (e.g. road and rail kills) and First Nations hunting considered when establishing the annual allowable harvest?

Regulated harvest rates for moose are highly variable. For example, a review of moose management in North America, reported rates that varied between 2% and 16%. In BC, sustainable rates appear to range from 3% to 9% and depend on population objectives and demographics of the moose population (e.g. growth rate, bull:cow ratios). Variation in harvest rates is related, at least in part, to regional differences in the magnitude of natural predation on moose and other human-caused moose mortalities.

The annual allowable harvest (AAH) means the number of moose that are allowed to be killed by resident and guided hunters each year, after the harvest needs by First Nations are accommodated. The following steps are used to determine an AAH.

1. Biologists first conduct a moose population assessment and determine the “maximum allowable mortality level” given parameters such as population size, recruitment and natural mortality (e.g. mortality associated with predation, weather conditions, etc.) The maximum allowable mortality level is the number of animals that are allowed to be killed by humans each year, while still enabling the population objectives to be achieved over the allocation period.
2. Biologists then estimate or otherwise account for First Nations harvest of moose for food, social and ceremonial purposes through the most appropriate means.
3. Other source of human-caused mortality, such as road/rail mortality, may also be estimated if there is a substantive level of mortality present.
4. The AAH is determined by subtracting the First Nations harvest and road/rail mortalities from the “maximum allowable mortality” level. The AAH is therefore the number of moose available to be harvested by licensed hunters each year.

The Province of British Columbia has a duty to consult and, where required, accommodate First Nations whenever it proposes a decision or activity (e.g. a moose hunting regulation) that could impact treaty rights or aboriginal rights (including title) - claimed or proven. The duty stems from court decisions and is consistent with the Province’s commitment to building a new relationship with First Nations in British Columbia.

5. What is a Selective Harvest Strategy (SHS) and what types of Harvest Strategies are used for moose in south-central BC?

While in the broadest sense, all strategies that direct different levels of harvest towards specific sex/age classes of moose can be considered to be a selective harvest strategy or SHS, most biologists consider a SHS to include the selective harvest of sex/age classes (e.g. cows and/or calves plus bulls); or the selective harvest of specific age-classes of bulls (e.g. spike-fork bulls). Many BC hunters only consider the Omineca moose harvest system as a SHS. The Omineca SHS, however, is only one of a number of different types of selective harvest systems used throughout BC and North America.

The objectives of a selective harvest strategy, as defined in the Wildlife Management Institute book "Ecology and Management of the North American Moose"<sup>1</sup>, are to protect and increase prime breeding animals, especially cow moose so that calf production is enhanced. Hunting pressure is also directed at age classes with the lowest reproductive potential such as spike-fork bulls and/or calves. Each SHS is also designed to achieve the management objectives (e.g. maintain bull:cow ratios above 30 bulls:100 cows), while maximizing hunting opportunity. The harvest strategies currently in place in south-central BC also attempt to address these objectives, and are as follows:

- Cariboo Model: Bull LEH, Antlerless LEH\*
- Okanagan Model: Bull LEH, Spike-Fork GOS
- Thompson Model: Bull LEH, Spike-Fork GOS, Antlerless LEH
- Kootenay Model: Bull LEH, Spike-Fork GOS, Antlerless LEH\*
- Omineca Model: Bull LEH, Spike-Fork GOS, Antlerless LEH, Calf GOS

\* The antlerless moose harvest in the Cariboo and Kootenay Regions is restricted to either 1 to 2 MU's. See question #11 for why there is not a spike-fork season in the Cariboo.

6. Does harvesting moose influence calf recruitment and natural survival rates?

There are two major theories for how harvesting moose can influence calf recruitment and natural survival rates. Wildlife managers consider both theories when developing moose harvest management strategies.

1. **Density-Dependence**: Harvesting, by lowering density, increases the available food supply to each animal, and raises the nutritional status of females which leads to higher conception rates, calf survival and ultimately yearling recruitment. The increase in nutritional status may also increase

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<sup>1</sup> Franzmann, A.W. and C.C. Schwartz. 2007. Ecology and Management of the North American Moose, 2<sup>nd</sup> Edition. University Press of Colorado. 733 pp.



adult natural survival rates. This is the basic theory upon which most sustained yield harvest management is based.

2. **Moose Socio-biology:** This theory, which has also been referred to as the “social stress” theory, suggests that high bull:cow ratios and a “near-natural age structure” for both bulls and cows are required to ensure synchronous breeding and a contracted calf drop, which in turn results in reduced calf predation and higher calf recruitment.

A research project in 1991 examined the influence of male age and sex ratio on reproduction of moose in BC and found no evidence that a reduction in prime and old aged bulls resulted in lowered pregnancy rates or delayed conception<sup>2</sup>. That study suggested that only very low bull:cow ratios in BC (i.e. < 20 bulls:100 cows) may influence reproductive success in moose. Further research has not been able to conclusively substantiate the minimum bull:cow ratios required to ensure maximum calf recruitment.

7. Does harvesting moose reduce predation rates for moose and is predator management a necessary component of a moose harvest strategy?

Wolves and bears are both effective predators on moose. Bears normally prey on young calves whereas any moose is potentially vulnerable to wolves throughout the year. Most moose harvest strategies attempt to promote first oestrus breeding, which helps to ensure that calves are born within a short period of time, and thereby reduce the time period where calves are at very high predation risk. Also, prime aged moose are normally less vulnerable to predation, except for bulls during the post-rut period. Biologists account for predation during the moose population assessment when an annual allowable harvest is established. Thus, while harvesting moose may help to reduce predation rates on calves, predator management is not a necessary component of a moose harvest strategy.

Where predators are abundant, moose populations exist at low densities and winter calf:cow ratios are typically 25 calves:100 cows or less. Under these conditions even a small harvest of cows may cause a moose population to further decline. Therefore, many wildlife management agencies employ a “bull-only” harvest strategy where predators are abundant, and moose densities and calf recruitment are low. Where predators are not abundant the selective harvest of cows and/or calves, in addition to a controlled bull harvest, is beneficial as it ensures that populations are maintained within habitat capabilities and within a range that optimizes harvest yield.

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<sup>2</sup> Thomson, R.N. 1991. An analysis of the influence of male age and sex ratio on reproduction in British Columbia moose (*Alces alces* L.) populations. MSc. Thesis. University of BC. 45 pg.

8. Is it important to maintain a “natural” bull:cow ratio in a hunted moose population? Why are moose populations always managed for a lower-than-natural bull:cow ratio?

Moose in south-central BC are serially monogamous which means that a bull will stay with one cow until it has been bred, and then look for another cow to breed. This breeding structure does not enable as many cows to be bred by one bull as is found in the Yukon and Alaska where moose may form a harem breeding structure. “Natural” bull:cow ratios (i.e. those not influenced by hunting), which may approach or even exceed 80 bulls:100 cows, are not required to ensure maximum first oestrus breeding in a hunted population. Harvesting more bulls than cows lowers the natural bull:cow ratio and is sustainable providing enough bulls are maintained for breeding. Although there is still uncertainty among moose biologists as to how much the natural bull:cow ratio may be lowered through hunting before there is a conservation concern, a post-hunt ratio of 30 bulls:100 cows is not believed to adversely affect breeding or calf survival in BC. The Ministry continuously assesses the “minimum post-hunt bull:cow ratio” (see question #3) to ensure that moose populations in BC are managed sustainably.

9. Is cow hunting necessary to manage a moose population for high productivity and high sustained yields?

Moose populations are most productive and produce the highest sustained yields when they are maintained at about 60% of their maximum density (or habitat capability). Hunting is an effective way to reduce and maintain moose populations at this lower density. When moose populations are primarily limited by their food supply, antlerless hunting is required to achieve this lower density. This may include cow or calf hunting or both. Modelling studies have shown that harvesting bulls and calves generally provides the highest sustained yields, while if yield is measured in terms of meat then harvesting bulls and some cows is most effective. Where wolf and bear predation maintain moose numbers at very low densities, cow harvesting is generally not advised. In this case, a small “bulls-only” harvest appears to be the only viable option for ensuring a sustained yield.

10. How are changes in the environment, especially those related to pine beetle and salvage logging (e.g. road access) in south-central BC, accommodated in a moose harvest strategy?

Forest harvesting and associated road access can affect moose populations and are therefore must be considered when developing moose harvest strategies. Forest harvesting reduces the amount of security cover for moose and makes them more vulnerable to harvest, but also can have a positive effect on a moose population by increasing the abundance and nutritional quality of food. Roads provide hunters with increased access to moose populations. Salvage logging associated with the mountain pine beetle epidemic in south-central BC has dramatically affected forest environments and has produced a vast network of roads. Many of these roads now allow access to previously lightly hunted populations. In order to avoid overharvesting moose, harvest strategies include LEH

or adjusted GOS seasons (e.g. shortened or outside of rut), which enables wildlife managers to control hunting activity.

11. Why is there not a spike-fork General Open Season in the Cariboo?

Many First Nation communities in the Cariboo rely heavily on moose for food, social and ceremonial purposes. A spike-fork season was initiated in 2004 but was withdrawn due to First Nation concerns. Any attempt to re-instate a spike-fork season will require consultation with First Nations in order to ensure that their rights are acknowledged and that any concerns are addressed. Although many resident hunters favour a spike-fork season, there have been opposing views among different stakeholders regarding a spike-fork season. Some clubs and individuals would like to see the increase in opportunity from a GOS spike-fork season, while others would rather retain the quality objectives around a LEH-only hunt.

12. Is the Omineca SHS model being considered as a pilot moose regulation in part of the Cariboo?

Yes. The Ministry has committed to examining the potential of applying the Omineca SHS model as a trial or “pilot” project within MU 5-02. However, there is a three-step process that the Ministry will follow before implementing the pilot. These include: (1) a moose population assessment to determine the level of harvest (including bulls, cows and calves) that could be sustained; (2) consultation on the pilot with First Nations, resident hunters and guide-outfitters; and (3) a decision on whether the pilot should go ahead, based on the population assessment, the level of support among stakeholders, and government’s legal obligations to consult and accommodate First Nations rights to harvest moose.

13. Why does BC not have a provincial moose management plan and why are there different moose harvest strategies in BC?

BC produced a preliminary moose management plan in 1979, and in 1990 produced a more comprehensive provincial moose management statement. Currently, provincial direction regarding moose harvesting is contained within the 2010 Provincial Moose Harvest Management Procedure. While a comprehensive moose management plan that addresses all issues pertaining to moose management is desired, there are other species management/recovery plans that have taken precedence due to greater conservation concerns.

When developing the Moose Harvest Management Procedure, a decision was made not to standardize moose hunting regulations throughout the province, but rather to standardize the process under which regulatory decisions are made. While there are some basic biological objectives that must be met in all managed moose populations (e.g. ensure post-hunt bull:cow

ratios remain above 30 bulls:100 cows), there are many different ways that a moose population can be managed and still meet the biological objectives. The variation in harvest strategies in south-central BC is in part due to different environmental influences; different needs by First Nations for food, social and ceremonial purposes; and different regional preferences among stakeholders for opportunity and harvest. Despite the regulatory differences, all of these strategies are achieving the basic biological objectives, and thus ensure that moose harvesting is sustainable in south-central BC.