FACT SHEET

October 2018

Ministry of Forests, Lands, Natural Resource Operations and Rural Development

Moose in B.C.

The moose is an iconic animal. First Nations rely on moose for social, ceremonial, and sustenance purposes. Moose also provide sustenance and recreational opportunities to resident and non-resident hunters. Hunting opportunities provide economic benefits through the sale of hunting licences and associated travel and accommodation expenditures. Collectively, moose play a vital role in the well-being of many communities and individuals.

Ministry staff and partners are continuing research, undertaking surveys, assessing moose health and working closely with First Nations and stakeholders to gain more understanding and better inform management decisions. In 2018/19, the ministry's investments in moose projects totaled nearly $2.05 million.

The ministry's five-year moose research project, started in 2013, was recently extended for another five years and expanded to investigate causes of calf mortality. This fact sheet also provides an update on implementing the 2015 Provincial Framework for Moose Management, and "A Strategy to Help Restore Moose Populations in British Columbia."

Highlights of the work conducted over the past year include:

- Calf survival was identified as an important factor in population trends. Initial findings suggest calf mortality in late winter and spring are a main contributing factor to the declines. The ministry is investigating multiple factors that may be causing the high mortality rates observed as part of the research project, and will use the results to better inform management decisions and project investments.
- The 2017 Plateau fires in the Chilcotin were aerially surveyed and show ungulates remaining in burned landscapes. In Zone 5-13A (60% of which was in the fire perimeter), surveys comparing moose densities before and after the wildfire showed moose populations remained stable.
- Surveys following the 2017 Elephant Hill Fire did not notice a change in moose numbers within the burned area and some of the highest densities observed were within the burned area.

Research:

The Provincial Moose Research Project is investigating cow and calf moose survival as it relates to landscape change. In April 2018, the Provincial Moose Research Project entered its sixth year.

- Since this project began in 2012, a total of 460 individual moose (400 cows and 60 8-month old calves) have been captured, handled and radio-collared.
- This project is currently monitoring 194 cow moose in five study areas. Each animal is sampled at capture for health parameters and then tracked by satellite via GPS-radio collars. If a study moose dies, the collar sends a signal to crews that then investigate the cause of mortality.
- Adult cow survival was above 85% in all years between 2012 and 2018. This level of survival normally indicates a stable population. Of those mortalities, predation was related to about 53% and about 19% appear to be health related.
- The most recent data showed cow survival from 2017/18 at 90%.
- Year two of calf (~8 month old) collaring expanded by collaring 40 calves in Bonaparte and Prince George South study areas. Annual survival of calves from capture to age 1 varied from 45% in 2017 to 75% in 2018. Cause of mortality for 21 calves was 12 predation, 8 health and 1 vehicle collision. All calf mortalities occurred between March 11 and May 23. A University of Northern BC (UNBC) student completed a complementary analysis of habitat selection of radio-collared moose in July 2018 (http://web.unbc.ca/~michael/Pubs/Matt%20Scheideman%20Thesis%20Final%20for%20distribution.pdf).
- The Habitat Conservation Trust Foundation is supporting a comprehensive 2 year cow survival analysis with UNBC to be completed in spring 2019. This analysis will inform management recommendations aimed at reducing moose mortality rates.
- For more information about the Moose Research project consult the following links:
  - Provincial Moose Research Project: Research Design 2014
  - Provincial Moose Research Project: Progress Report 2015
  - Provincial Moose Research Project: Progress Report 2016
  - Provincial Moose Research Project: Progress Report 2017
  - Provincial Moose Research Project: Progress Report 2018
- The annual online moose winter tick survey, which started in 2014, is continuing. The degree of hair loss reported by the public and scientists helps indicate the prevalence and severity of tick infestations on moose, which can have a direct impact on their survival. For more information visit: www.gov.bc.ca/wildlifehealth/mooseticksurvey

Moose Enhancement:

- In 2018/19 total investments towards moose projects are approximately $2.05 million. Projects include population inventory, habitat designation, habitat enhancement and assessment of species-interactions.
- Moose enhancement funds contributed to 60km of road rehabilitation on the Bonaparte Plateau north of Kamloops in partnership with T'kemlups Indian Band.

Broadening Moose Enhancement via Renewed Forestry Practices and the Cumulative Effects Framework:

- To strengthen the management of all forest values, a number of improvements were made to Forest Stewardship Plans (FSPs):

- The Chief Forester guidance can be found at: http://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/laws-and-policies/to_all_dms.pdf

- The Ministry continues to develop specific planting guidance for the management of non-timber values; there is work underway to develop forestry replanting direction (stocking standards) tailored to also support moose habitat creation. This will include the options for the planting of different tree species or stock age – all of which can be used to create reforested habitat that is better for moose.

- Moose habitat is also being addressed through a number of provincial funds. Once key areas for moose management/recovery are identified projects can include moose-enhancement components such as:
  - Targeted Forest Service road deactivation and access management.
  - Changes in brushing strategies to enable growth/retention of cover/forage.
  - Planting quick-growing species along roadsides and in riparian areas.
  - Not planting wetter areas, and letting them regenerate with species such as willow.

- Through the Forest and Range Evaluation Program the ministry is building a moose protocol to evaluate site-level assessment of habitat, post-harvest. This information will be used to help improve forest practices and monitoring of overall trends in habitat characteristics. The moose protocol is in the final design stage and will undergo stakeholder review shortly. The intention is for the protocol to be included in field sampling for the ministry's natural resource districts. Likely, it will be applied to targeted areas, where moose populations have been identified as a concern.

- The ministry is leading the development of Natural Resource Monitoring and Assessment Reports, which compiles the best available information on the specific values for a geographic area. These reports incorporate FREP data (above) along with Cumulative Effects Framework assessment information, as well as additional information for other priority wildlife. Information on moose populations and trends is becoming a standard component included in the Natural Resource Monitoring and Assessment reports. These reports are collating information for both moose populations and habitat trends which are core considerations for resource management decision makers. A draft CEF moose assessment protocol will start being used in Fall 2018.

Moose Inventory:
In 2017/18 there were 11 population surveys, 9 composition surveys, and 5 calf-at-heel surveys conducted in six regions. The most recent moose population estimate for B.C. is 120,000 to 205,000. http://www.env.gov.bc.ca/fw/wildlife/management-issues/docs/2017_Provincial_Ungulate_Numbers_Sept_18_Final.pdf

Some surveys analyzed the estimated population size and density of moose on the landscape while others were done to determine the composition of the moose population (a key indicator in determining population trends). For a regional breakdown of the most recent inventory results, see below.

Region by Region Analysis

The following is a region-specific breakdown of this year's survey work. Note that bull:cow ratio of 30 bulls per 100 cows is considered desirable; although in areas where moose densities are low (typically in the far north), the ratio should be 50 bulls per 100 cows. A ratio of 25 to 30 per 100 cows is considered a good calf:cow ratio for stable populations, but should be higher if increasing populations are desired, since calves are counted in winter and suffer additional mortality throughout the spring and summer. Both types of ratios are used by wildlife managers as indicators of population trends.

Peace Region:

- Two surveys were conducted in the Peace Region in 2017/18: Management Unit (MU) 7-32 in the North Peace Game Management Zone (GMZ) and MU 7-31 in the South Peace GMZ. Overall, the survey results suggest relatively stable to increasing moose populations in these GMZs.
- MU 7-32 population estimate increased by 14% since 2012, with moose appearing to be thriving with the availability of early seral, regenerating cutblocks and mix of deciduous and coniferous forests. The bull:cow ratio exceeds management targets at 41:100, while the calf:cow ratio was indicative of an increasing population at 44:100. The overall population density was 0.94 moose/km^2.
- MU 7-31 population estimate declined by 12% since they were last surveyed in 2013. The bull:cow ratio was above the provincial management target at 44:100, however the calf:cow ratio was low at 21:100 (in late-December). The overall population density in the eastern portion of the MU (excluding the mountainous portions) was 0.44 moose/km^2. This area has been subjected to intensive wolf removal in support of caribou recovery over the past four years, yet moose numbers, and particularly calf survival do not appear to be responding positively. This suggests other factors may be limiting population growth. This was the first time 7-31 West was surveyed. Very low densities of moose (0.045 moose/km^2) were observed, but these results provide a baseline for future monitoring.
- Other ongoing regional initiatives include the finalization of the Peace-Liard Moose Management Plan, the continued monitoring of winter tick infestations in local moose populations, predator monitoring in the Northeast Rockies GMZ, the development of a prescribed burn plan to address moose habitat enhancement, and collaboration with forest companies to develop beneficial moose management practices and updated habitat mapping.
- The provincial government and Saulteau First Nations have established a Collaborative Moose Working Group with support from the Fish and Wildlife Compensation Program (FWCP) Peace Region Moose Limiting Factors Project. The group conducted the population survey in MU 7-31, which was not planned for surveying by the province in 2017/2018. This MU completely overlaps with the Moberly study area for the FWCP Peace Region Moose Limiting Factors Project.

Omineca Region:

- Surveys were conducted in the Parsnip and Southern Omineca areas.
- The Southern Omineca composition survey included areas around Prince George, Fort St James and the Parsnip drainage. Long term monitoring has found calf:cow ratios decline from averages of 40 to averages of 30. From the 2017/18 survey, there were 28 calves per 100 cows varying from 12 to 36. Overall, there were 39 bulls per 100 cows with areas varying from 15 to 61.
- The Parsnip population survey data is currently being analyzed.
- There are two study areas from the Provincial Moose Research Project in the Omineca: Prince George South and the John Prince Research Forest (near Fort St. James). March calf-at-heel surveys of collared cows found 37 and 26 calves per 100 cows in John Prince Research Forest and Prince George South study areas, respectively. Any discrepancy between results from the collar survey and formal composition survey are likely a result of sample size difference.
- Current research projects include moose forage analysis (effects of harvesting on digestible protein and tannin levels in preferred moose browse), habitat supply and ungulate winter range (identifying critical winter habitat), herbicide and moose forage analysis (investigating possible effects of forest herbicide applications on quality of browse), and winter forage in fertilized and unfertilized stands.

Skeena Region:

- Surveys were conducted in the Bulkley Valley/Lakes District and Entiako areas.
- In the Bulkley Valley/Lakes District area (that includes most of MUs 6-4, 6-5, 6-6, 6-8 and 6-9), the density decreased from 0.96 moose/km^2 in 2012 to 0.59 moose/km^2 in 2018. The bull:cow ratio of 24:100 decreased by 25% from 2012 and is below the provincial objective. The calf:cow ratio of 31:100 decreased by 16% since 2012.
- In the Entiako area, calf-at-heel surveys from collared cows indicated a ratio of 15:100 cows (4 calves observed from 26 collared cows). The calf ratio was higher than the 2016 and 2017 Entiako calf-at-heel surveys. This survey is part of the Provincial Moose Research Project that will help inform future management efforts. An inventory survey is planned for this population management unit in January 2019.
- Several moose regulation changes were introduced in the Skeena Region in July 2018.
- In Skeena south (MUs 6-01 to 6-11, 6-14 to 6-16, and 6-30) the seven-day general open season (GOS) for any bull was reduced to three days, while retaining the existing LEH and bow only seasons. This change was a result of a decrease in the Annual Allowable Harvest (AAH), the low bull:cow ratios observed, and the number of moose that can be sustainably harvested annually by resident hunters. The number of LEH authorizations available and guide allocations in these MUs were also adjusted to meet available AAH.
- In Skeena north the regulation changes include a GOS reduction by three days in MUs 6-17 to 6-29, a new LEH zone in the Klappan, and creation of antler restriceted areas in both the Atlin (6-25 and 6-27) and Dease Lake (6-21 to 6-24) areas. These regulation changes were implemented to address First Nations food, social and ceremonial objectives and their concerns about high licensed hunter use of culturally important areas. Anticipated increased licensed hunter pressure in these MUs were expected following the reduced GOS in Skeena south and recently introduced hunting restrictions in the rest of the province.

Cariboo Region:

- Surveys were conducted in six MUs with mixed results.
- In Horsefly River (MU 5-02B), moose densities increased by 18% since 2006. The bull:cow ratio was 20:100; lower than the 2006 findings. The calf:cow ratio was 30:100 cows, an increase from the 2006 calf:cow ratio.
- In Baker Creek (MU 5-13B), the estimated moose density increased over 19% from 1999. Bull:cow ratio was 24:100 cows which falls below the provincial minimum target, while calf:cow ratio was 38:100 cows.
- Composition surveys conducted in MUs 5-01, 5-02B, 5-02C, 5-03, and 5-14 found bull:cow ratios ranging from 15 – 36 bulls per 100 cows and calf:cow ratios ranging from 16 – 59 calves per 100 cows at the time of the survey.
- Overall, bull:cow ratios in the Cariboo were below provincial minimum targets with the exception of MU 5-03 where an increase in bull:cow ratios was observed.
- In Alexis Creek (MU 5-13A), an attempt to understand the impacts of the Chilcotin Plateau wildlife to the moose population in this management unit, a replicate block survey was conducted. Approximately 60% of this MU is within the Chilcotin Plateau wildfire perimeter and was previously surveyed in 2017 pre-wildfire. 26 blocks were re-surveyed with total moose sightings increasing by 9% in resurveyed blocks. An increase in total moose sighted was observed in blocks both inside and outside the burn perimeter polygon.
- In Big Creek (5-04), calf survival was measured by assessing radio-collared cow moose. March calf-at-heel surveys revealed a ratio of 32 calves per 100 cows (12 calves observed from 37 collared cows), an increase from the 2017 survey.
- Surveys in the Alexis Creek, Kluskus and Rose Lake areas are planned for 2018/19 to monitor the status and trends in moose populations.

Thompson Region:

- Stratified random block surveys were conducted in two management units north of Kamloops (3-29 and 3-30B) during the winter of 2017/18. These units also form the Bonaparte moose research study area.
- Overall moose densities in the survey area declined by 14%, from 296 to 254 moose/1000km^2 since 2013.
- Bull ratios were 19 and 28 bulls per 100 cows in MUs 3-29 and 3-30B, respectively and calf ratios were 34 and 33 calves per 100 cows in MUs 3-29 and 3-30B, respectively.
- Annual adult female survival rates measured in the survey area since 2012 ranged from 0.87 (2015) – 0.98 (2017) and averaged 0.92 ± 0.03 (SE). These survival rates are sufficient to maintain stable to increasing moose populations, which indicates calf survival and recruitment is a main factor causing populations to decline in this area.

Okanagan Region:

- A survey was conducted in MU 8-10 during the winter of 2017/2018.
- Numbers of moose were similar to previous habitat and survey-based estimates suggesting populations have remained stable since at least 2011 when the last survey was conducted.
- The estimate for MU 8-10 was 272 ± 38 (90% CI).
- The estimated density was 0.28 moose/km^2 for the census area within the MU.
- Calf:cow ratios were 37:100 and bull:cow ratios were 30:100 cows.

Kootenay Region:

- Surveys conducted in the Elk Valley (MU 4-23) and Bull River (MU 4-22) estimated populations of 509 and 196 moose, respectively. These results suggest both moose populations declined by approximately 50% over the past decade. In the Elk Valley, moose densities declined from 0.6 moose/km^2 in 2007/08 to 0.39 moose/km^2 in 2017/18. Bull River moose densities declined from 0.78 moose/km^2 in 2005/06 to 0.38 moose/km^2 in 2017/18.
- Calf:cow ratios were 11:100 in the Bull River and 41:100 in the Elk Valley. The bull:cow ratio was 73:100 in the Bull River and 49:100 in the Elk Valley.
- Ongoing moose population monitoring in the Lake Revelstoke area (MU 4-38 and 4-39) has shown a recent increase in moose population trend and very high recruitment with 64 calves per 100 cows).

Fish & Wildlife Compensation Program (FWCP)

Similar to the Provincial Moose Research Project, in 2015 the FWCP's Peace Region Board began a five-year research project investigating the limiting factors affecting cow moose survival in the FWCP's Peace Region. The project is currently monitoring 83 cow moose and their calves by surveying them three times per year (June, December, March) in the Moberly (Region 7B) and West Parsnip (Region 7A) areas in the southern portion of the Williston Basin.

- Survival rates range from 83% – 93% with stable to increasing female growth rates (λ= 1.02-1.12).
- Calf-at-heel survey results found twice as many calves surviving until March in the West Parsnip study area than in the Moberly study area.
- 2018/19 is the fourth year of this five-year project. Monitoring of 83 collared cow moose will continue, including investigating mortalities and conducting three calf surveys to determine calf production, calf survival, and calf recruitment (the number that survive to be one-year-old).

For more information on this project, including year-end reports visit http://fwcp.ca/project/investigating-factors-limiting-moose/

Outreach:

- Ministry staff continues to communicate closely with First Nations and regional and provincial wildlife stakeholders on program delivery and status of the moose enhancement program and research.
- The BC Wildlife Health program (WHP), in collaboration with a number of First Nations and the First Nation Health Authority (FNHA), has developed a Wildlife Health Matters training workshop for First Nation communities. The full-day workshop is delivered on request. It and includes discussion on general aspects of wildlife health and how to develop a community driven wildlife health assessment and monitoring program. It may also involve a practical demonstration of sampling techniques for hunters and community members. The workshops have been held at community halls, culture and hunting camps and are built around the hunted species of most interest to the community as well as any issues of concern. A series of posters and fact sheets have been developed for this program on

moose health. The workshops are delivered in partnership with the WHP and FNHA-sponsored online Local Environmental Observer Network.

- In addition to significant in-house expertise, the Province also works collaboratively with universities to improve science information to guide moose management.
- The Province also commissioned a series of short films on wildlife survey methods and the results of some recent wildlife surveys. This is part of an ongoing effort to find innovative ways of sharing the information we collect with the public. Videos include:
    - How we count moose (https://www.youtube.com/watch?v=tMOlK2jwzN0
    - What we do with survey data https://www.youtube.com/watch?v=p8FdBM6OLUs
    - Alsek moose survey results (Skeena region): https://www.youtube.com/watch?v=6HphraH1haA
    - Peace region survey results: https://www.youtube.com/watch?v=O68o2R5mF2E
- The BC Moose Tracker is an official Government of British Columbia app that allows hunters to play an important part in moose conservation and management. It is in its third year of use and is available for download through iTunes. The app allows hunters to upload information about the moose they encounter directly to a province-wide database, helping wildlife staff monitor moose populations and respond to emerging issues. The BC Moose Tracker app was developed by the B.C. Government with support from the Habitat Conservation Trust Foundation and the BC Wildlife Federation.

Previous Moose Fact Sheets:

- 2017 Moose Fact Sheet: http://www.env.gov.bc.ca/fw/wildlife/management-issues/docs/2017_moose_fact_sheet.pdf
- 2014 Moose Fact Sheet: http://www.env.gov.bc.ca/fw/wildlife/management-issues/docs/factsheet_provincial_moose_population_june2014.pdf
- 2013 Moose Fact Sheet: http://www.env.gov.bc.ca/fw/wildlife/management-issues/docs/factsheet_provincial_moose_population_april2013.pdf
- 2012 Moose Fact Sheet: http://www.env.gov.bc.ca/fw/wildlife/management-issues/docs/factsheet_provincial_moose_population_may2012.pdf

Contact:

Media Relations
Ministry of Forests, Lands, Natural Resource
Operations and Rural Development
250 356-7506