2016-2022 Antler Restriction Pilot Project (ARPP) Concerning White-Tailed Deer in Québec

SUMMARY OF THE KEY OUTCOMES

Context

An antler restriction is a method that seeks to protect young bucks mainly one and a half years old from hunting to potentially allow them time to develop their body mass and antlers and to attempt to enhance the quality of the hunting experience. An antler restriction limits hunting to male deer whose antlers display certain characteristics, usually based on the number of points.

The regulated antler restrictions governing white-tailed deer are applied or have been applied in variable areas in several American states. However, no large-scale experimentation on the topic had yet been conducted in Canada at the northern boundary of the deer's distribution area, where winter conditions significantly affect population dynamics.

In the context of the elaboration of the *Plan de gestion du cerf de Virginie au Québec 2010-2017*, the Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs, with the support of wildlife partners, tested an antler restriction to rigorously assess the biological and socioeconomic impacts on white-tailed deer of such a measure in Québec. More specifically, the project sought to ascertain the impact of an antler restriction on the male deer harvested, the deer population, and the hunting clientele.

Accordingly, an antler restriction limiting the hunting of adult bucks with at least three points of 2.5 cm or more on one side of the antlers was evaluated for five years during the 2017 to 2021 hunting seasons in Zone 6 North and Zone 6 South, an area of more than 4 000 km^2 located mainly in the Estrie region. The adjacent Zone 7 South in the Centre-du-Québec region served as a comparison (control) zone (Figure 1 and Figure 2).

The zones were selected because they satisfied all the preconditions to the pilot project:

- the interest in participating displayed by the regions and stakeholders involved;
- a high density of deer and a significant hunting harvest that facilitates the detection of the potential impact of the management method;
- the possibility of increasing the number of antlerless deer hunting licences allocated by random draw to offset the anticipated drop in the harvesting of bucks.

The five-year pilot phase was the minimum time required to properly measure the biological and socioeconomic impacts of the antler restriction in Québec's climatic context, where significant annual fluctuations of deer populations can arise and affect the variables studied.

Reference data were collected in 2016-2017 prior to the implementation of the antler restriction in the fall of 2017. Data collection occurred from November to May each year and was completed in 2022.

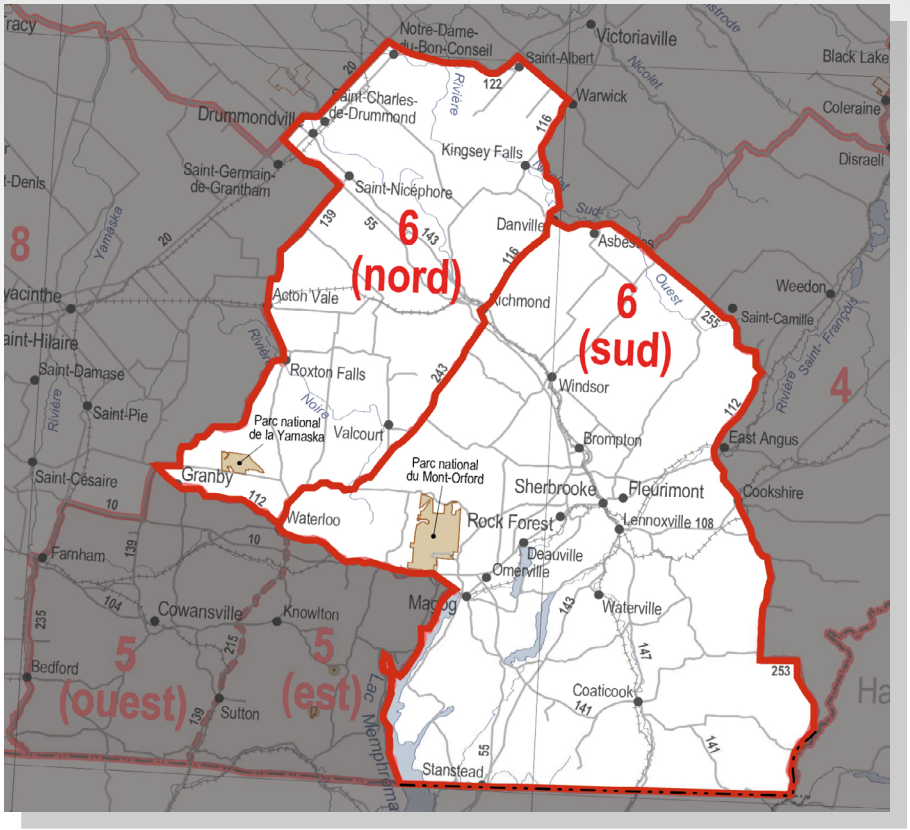


Figure 1. Hunting zones subject to the antler.

Figure 2. Examples of deer that may or may not be hunted in Zone 6 North and Zone 6 South subject to the antler restriction.

Objective of the summary

This simplified summary seeks to inform the clientele of the key outcomes of the pilot project and the attendant conclusions.

Research questions

The pilot project sought to answer several questions related to the direct biological or socioeconomic impacts of an antler restriction applied in Québec. Certain as yet scientifically unproven hypotheses that an antler restriction can have potential indirect biological impacts on the survival or reproduction of deer, e.g., gestation rate and date of conception, were also tested. The research questions were divided into three main sections, i.e., the impacts of an antler restriction on the deer bucks harvested, the deer, and the hunters (see box).

Does the antler restriction affect:

1. the bucks harvested?

- age structure
- physical characteristics at a given age

2. deer populations?

- antlerless deer harvest
- population size
- buck:doe ratio observed by hunters
- deer productivity
- date of conception
- survival of fawns

3. the hunters?

- hunting success
- number of hunters (pressure)
- hunting effort
- hunter satisfaction
- hunters' support for the management method

Key outcomes

1. The deer bucks harvested

In order to ascertain the antler restriction's impact on the age structure and the physical characteristics of the deer bucks harvested in the zones under review, the deer killed during the 16-day firearm hunting period were measured each year. More than 2 700 adult bucks or fawns of both sexes were measured at registration stations or butcher's shops from 2016 to 2021 (Table 1).

Table 1: Number of deer bucks measured at registration stations or butcher's shops (2016-2021). The class 0.5 year (fawn) also includes does.

Age (year)	Zone 6 North	Zone 6 South	Zone 7 South	Total
0.5	131	180	146	457
1.5	172	153	326	651
2.5	259	244	196	699
3.5	208	160	114	482
4.5	96	96	44	236
5.5	45	40	14	99
6.5	13	15	14	42
7.5	11	9	6	26
8.5	3	2	4	9
9.5		4	3	7
10.5	3	1	1	5
11.5	1		2	3
12.5	2			2
Total	**944**	**904**	**870**	**2718**

The eviscerated deer's weight and the characteristics of the antlers such as the number of points, the inside spread, and the diameter of the beams, were recorded. Since the exact age of an adult deer cannot be determined based on its physical characteristics, the two incisors were removed to determine their age in the laboratory by counting the cementum rings of the teeth.

The data collected in 2016 prior to the application of the antler restriction confirmed that the antler restriction standard of three points on one side of the antlers excluded from hunting the majority of deer one and a half years old (87%) and just less than half the two-and-a-half-year-old deer, which satisfied the objective that the management method targets (Figure 3).

The antler restriction modified the age structure of the deer bucks harvested. The proportion of individuals one and a half years old decreased significantly in the harvest, which mainly comprised deer between two and a half and three and a half years old (Figure 4).

After five years of application, the antler restriction did not contribute to degrading or enhancing the characteristics of bucks of a given age, i.e., eviscerated weight and attributes of the antlers.

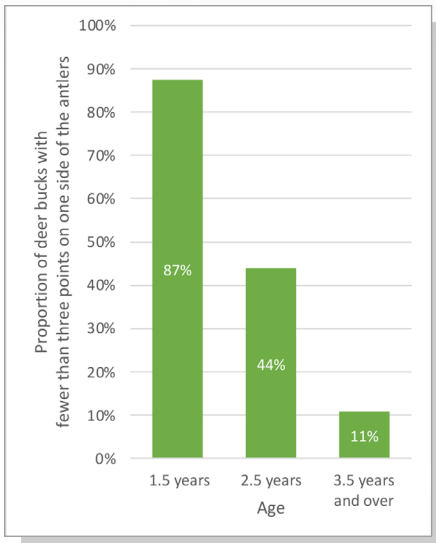


Figure 3. Proportion of antlered deer bucks measured in the fall of 2016 prior to the antler restriction that did not have at least three points on one side of the antlers according to their age group (n = 488). The deer would have been ineligible for hunting if the antler restriction had been in force.

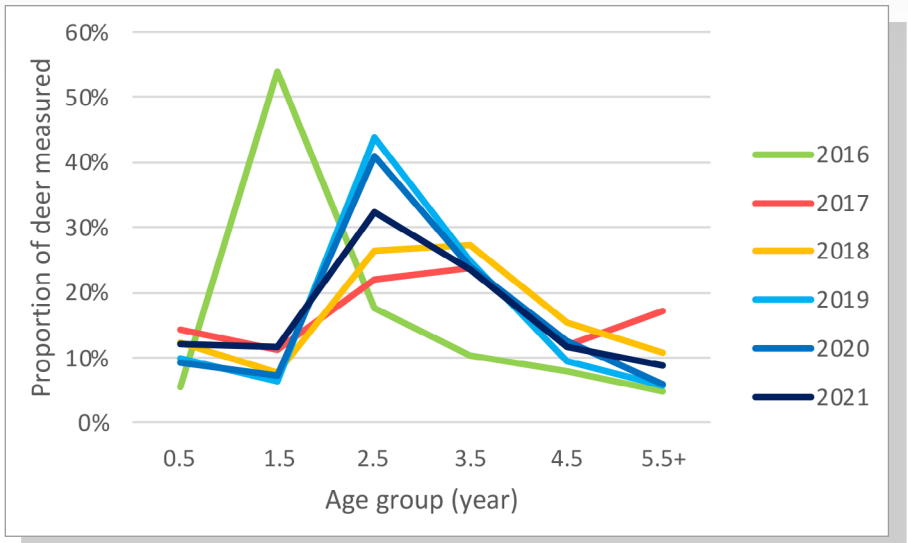


Figure 4. Proportion of deer bucks measured in the zones with antler restrictions by age group and year. The year 2016 preceded the antler restriction. The class 0.5 year (fawn) also includes does.

2. Deer populations

Abundance

Several indicators of the abundance of deer were used to examine the trends in the populations in the zones under review.

The antler restriction had no impact on the number of road collisions involving deer reported on the provincial road network compiled by the Société de l'assurance automobile du Québec (SAAQ). This indicator is related to the deer population density in the regions where it is average or high.

Aerial surveys were also conducted in the zones under review at the outset and the conclusion of the pilot project, but this indicator did not have the anticipated efficacy to provide deer population trends. The scientific protocol linked to the winter survey requires compliance with certain conditions that are now difficult to obtain in southern Québec, such as minimum snowfall that encourages the deer to group together in wooded environments to save energy.

Lastly, a survey sent each year to the 9 000 randomly selected hunters among those likely to hunt deer in Zone 6 North, Zone 6 South, and Zone 7 South provided information on the profile of deer hunters, their harvest and their observations. With more than 3 000 respondents each year, the survey provided accurate data, especially on deer population trends, through the hunters' observations of the number of deer sighted and killed per hunting day.

There were no significant differences between the antler restriction zones and the control zone as regards the average number of deer sighted per hunting day (Figure 5) nor from the standpoint of the average number of bucks or does sighted.

What is more, the antler restriction had no impact on the average number of deer shot per hunting day. However, the average number of bucks killed in 2017 and 2021 was significantly lower in the antler restriction zones in relation to the control zone (Figure 6).

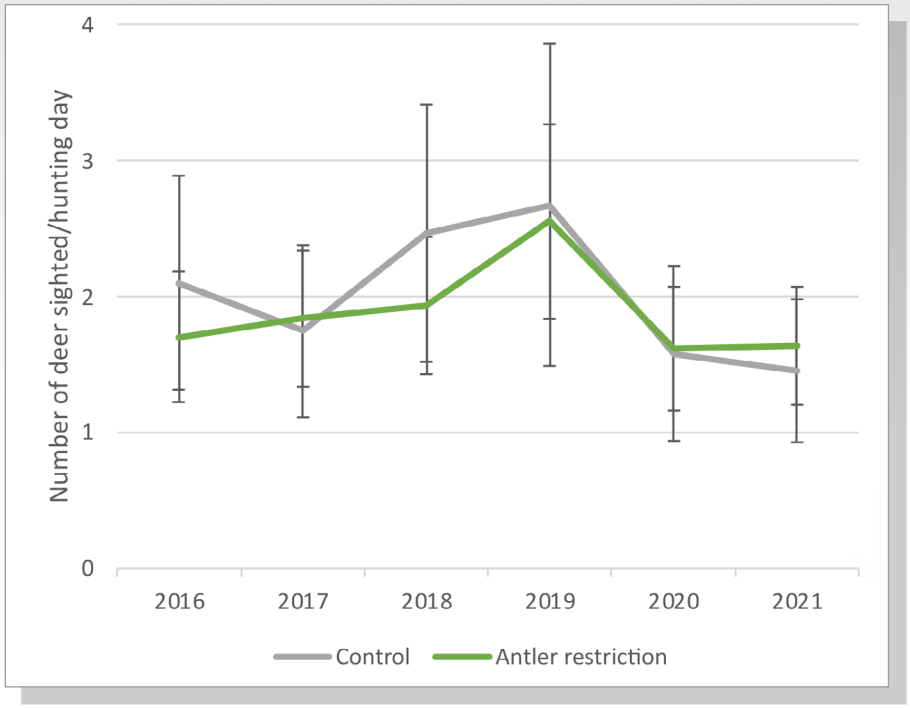


Figure 5. Daily average number of deer sighted per hunting day during the 16-day firearm hunting period in the antler restriction zones and the control zone. The year 2016 preceded the antler restriction. The vertical bars represent the standard error.

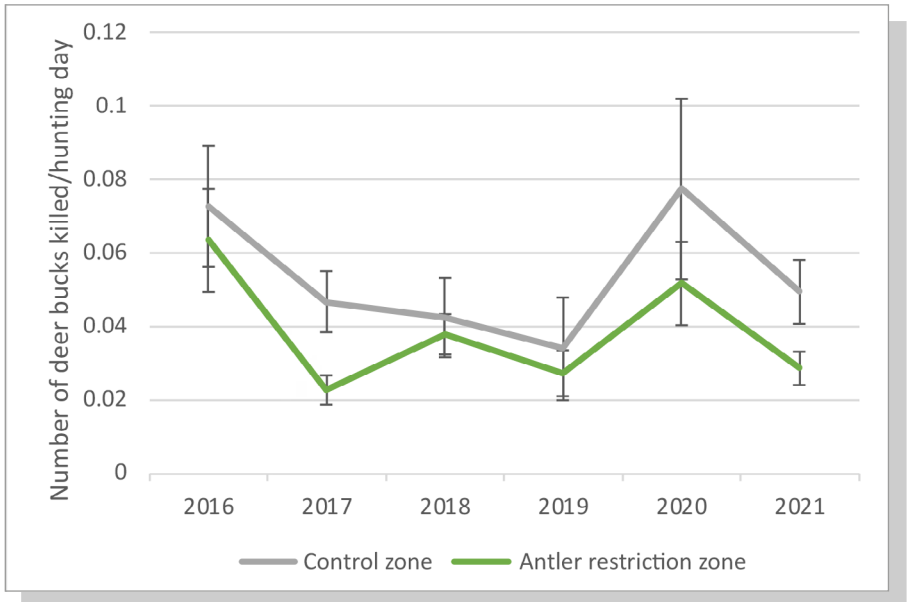
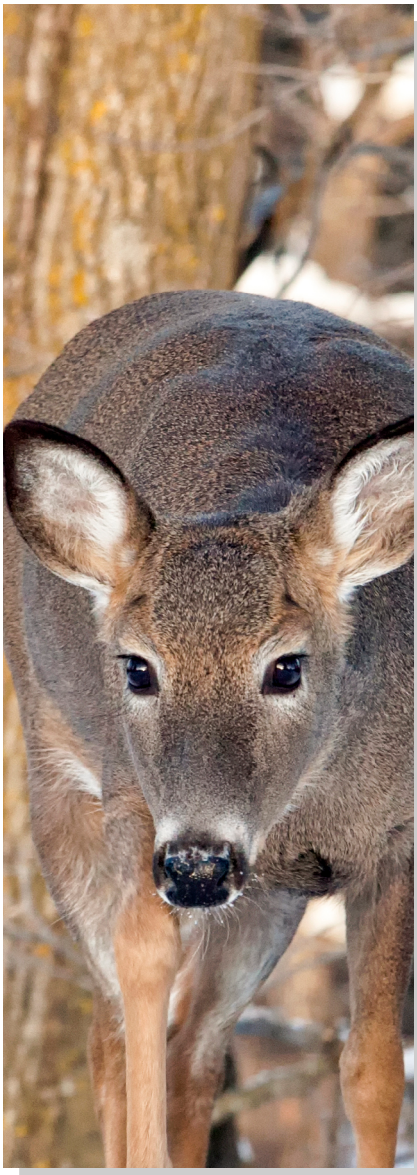


Figure 6. Daily average number of deer killed per hunting day during the 16-day firearm hunting period in the antler restriction zones and the control zone. The year 2016 preceded the antler restriction. The vertical bars represent the standard error.

The average number of does killed per day remained higher in the antler restriction zones than in the control zone since 2017 because of the more than 50% increase in the number of antlerless deer hunting licences granted by random draw in these zones (Figure 7). This led to an annual 10% to 15% increase in the proportion of antlerless deer in the harvest in the antler restriction zones in relation to the control year (2016).



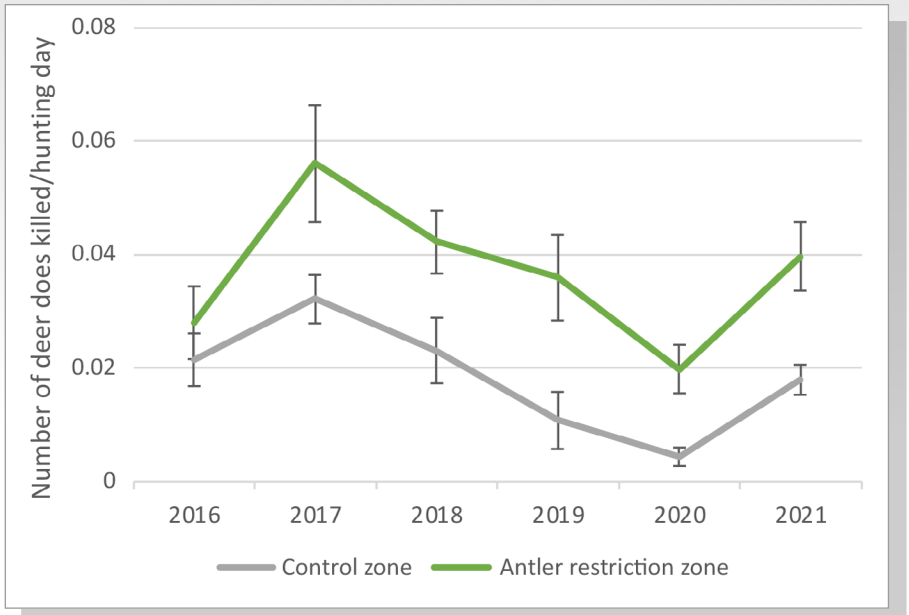


Figure 7. Daily average number of deer does killed per hunting day during the 16-day firearm hunting period in the antler restriction zones and the control zone. The year 2016 preceded the antler restriction. The vertical bars represent the standard error.

Reproduction

The pilot project also sought to verify the scientifically unproven hypotheses often conveyed by the media on the indirect biological benefits that an antler restriction may have on deer populations. According to such hypotheses, an antler restriction appears to improve the buck:doe ratio and, ipso facto, to promote the fertilization of the does, shorten the mating season, hasten calving and, ultimately, increase the survival rate of fawns the following winter by allowing them more time to accumulate reserves.

These reproduction-related data were taken from does killed by road collisions from March to May. The data were used to determine the gestation rate, i.e., the number of does with at least one fœtus, productivity (the number of fœtus /doe), and the date of conception of the fœtus. The distribution of the conception dates over time facilitates the verification of whether the antler restriction affects the time and duration of the mating season. The buck:doe ratio and the survival of fawns until the fall were estimated by means of hunters' observations during the 16-day firearm hunting period. The eviscerated weight of the fawns measured at the registration stations or butcher's shops allowed for the evaluation of their accumulated body reserves, linked to their survival during the winter.

There were no significant differences in the buck:doe ratio observed by hunters between the antler restriction zones and the control zone, except a gap in 2020 attributable to a marked drop in the number of antlerless deer hunting licences allocated in this zone (more does were visible during hunting) (Figure 8).

In the antler restriction zones, the buck:doe ratio observed has tended to be slightly higher since 2017, i.e., roughly one buck for three does instead of one buck for four does in 2016, but the differences are not statistically significant. The buck:doe ratios obtained are deemed imbalanced for a cervids population even though the ratios are based on observations during hunting, which are considered to be biased in favour of does.

The antler restriction had no impact on the gestation rate or the number of fawns produced per doe.

Accordingly, the vast majority of adult does mated regardless of the zone. The gestation rate is higher among does two and a half years of age and over (91%) and they predominantly have twins, while single fœtus are more frequent in does one and a half years old (Table 2; Figure 9). While does not accompanied by fawns are observed at the time of hunting, this does not mean that they did not mate. The literature indicates that the mortality rate of fawns until the fall varies each year and can sometimes be very high.

No impact of the antler restriction was noted on the proportion of fawns in the population evaluated by means of the hunters' observations or the weight of the fawns in the fall, variables that are strongly influenced by the year and the harshness of the winter.

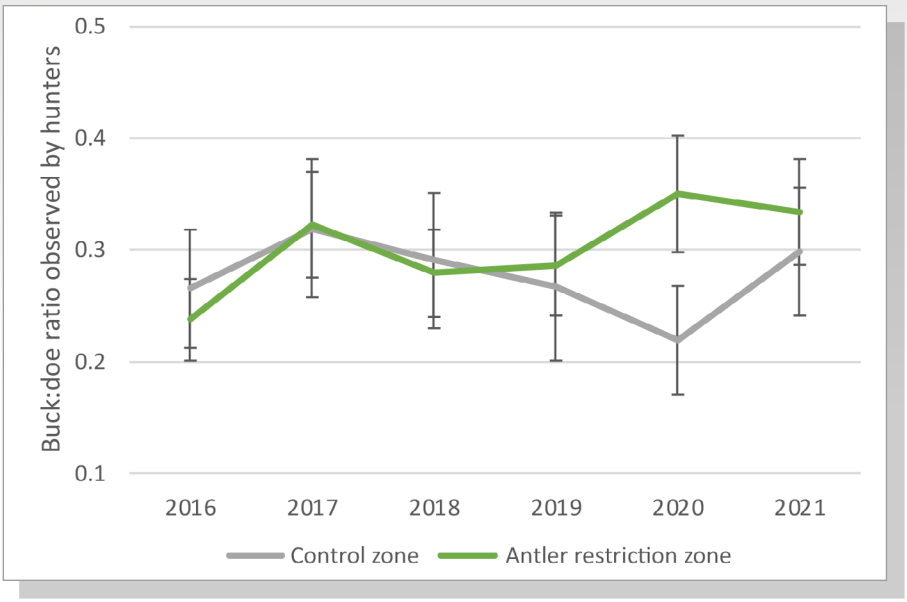


Figure 8. Buck:doe ratio $\left(\frac{Number\ of\ bucks}{Number\ of\ does}\right)$ of deer sighted by hunters during the 16-day firearm hunting period in the antler restriction zones and the control zone. The year 2016 preceded the antler restriction. The vertical bars represent the standard error.

Table 2: Proportion of gestating deer does in the zones under review by age group.

Age group	Number of does measured	Number of gestating does	Proportion of gestating does
Half a year old	166	6	4%
One and a half years old	130	92	71%
Two and a half years and over	319	290	91%
Total	**615**	**388**	**(one and a half years and over) 85%**

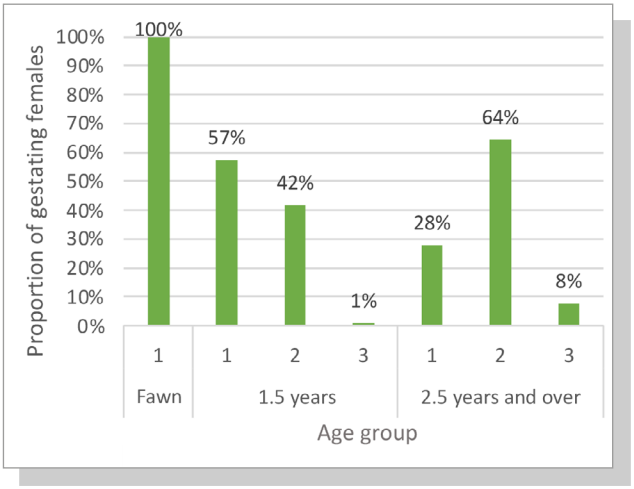


Figure 9. Proportion of gestating does in the zones under review by age group and number of foetus carried.

Neither the antler restriction nor any other variable such as the harshness of the winter, the age group, and year, had an impact on the date of conception. Roughly 88% of the does were inseminated over a five-week period that may correspond to the first ovulation period.

This finding is coherent in the climatic context of the northeastern portion of North America where the window favourable to the reproduction of white-tailed deer is very limited. Indeed, this species is found as far as Peru and in the southern portion of its distribution area it can reproduce at almost any time of the year. However, winter conditions and vegetation growth cycles farther north reduce to a few weeks the optimum calving period and, consequently, the mating season.

Several reasons can explain why certain does mated belatedly. A doe that has not been inseminated or whose gestation is interrupted can again become fertile 28 days after the first ovulation if the conditions allow for it. Certain does can also reach the minimum physical condition for reproduction later than others. If the beginning of the winter is mild, fawns may even reach sexual maturity (six to seven months) and reproduce even if the phenomenon is rare in our latitudes (4% of gestations in this pilot project).

2. The hunters

The antler restriction pilot project also sought to ascertain whether the management method had an impact on the number of hunters who hunt in the zones (hunting pressure), the number of days necessary to harvest a deer (effort), and the proportion of hunters who harvested a deer (success). Moreover, it sought to determine the hunters' level of satisfaction and their support for the management method according to the time elapsed since its inception.

Pressure and hunting

Hunting pressure in the antler restriction zones, i.e., the number of licences sold for such zones, did not increase significantly during the project. What is more, the findings of the annual survey reveal that, during the 16-day firearm hunting reference period, the antler restriction had no impact on the average number of days spent hunting (six), except for a one-day increase in relation to the control zone the year the management method was implemented (2017). Furthermore, hunting did not vary and remained stable at around five days.

Hunting success

The antler restriction did not affect overall hunting (Figure 10). However, hunting success in respect of adult bucks in the antler restriction zones remained significantly lower than it was in the year preceding the antler restriction (Figure 11).

Photo: S. de Bellefeuille, MFFP

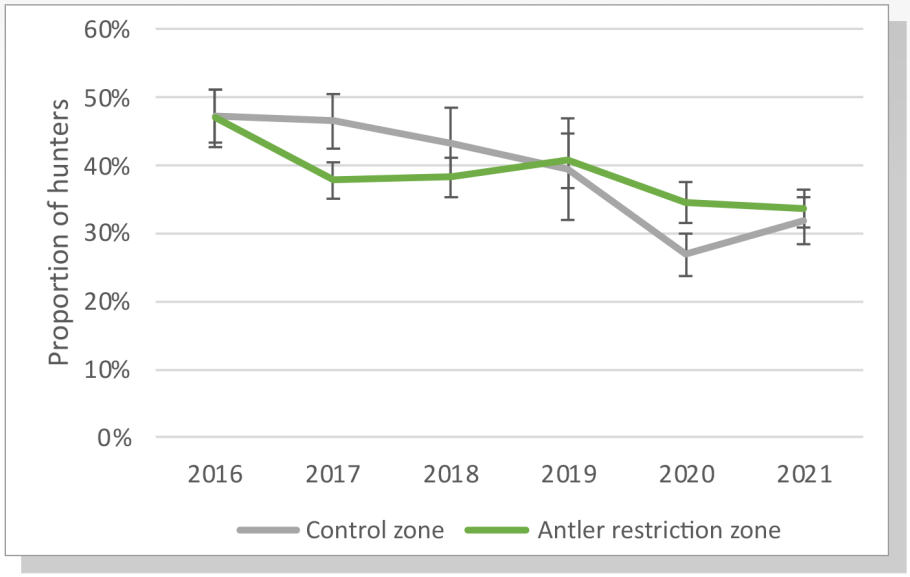


Figure 10. Overall hunting success (proportion of hunters who killed a deer) during the 16-day firearm hunting period in the antler restriction zones and the control zone, according to the annual survey.

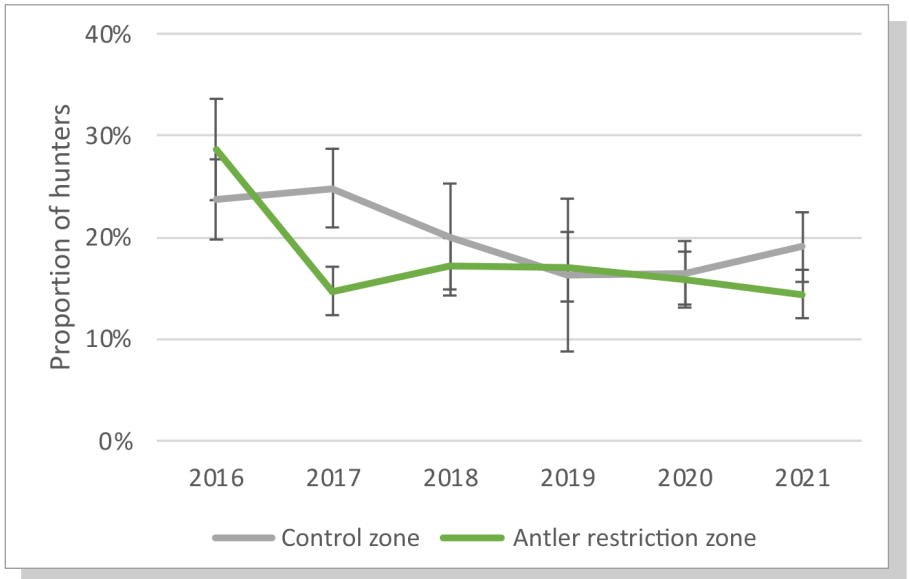


Figure 11. Hunting success in respect of adult bucks (proportion of hunters who killed an adult deer buck) during the 16-day firearm hunting period in the antler restriction zones and the control zone, according to the annual survey.

Hunter satisfaction

In the context of the annual survey, hunters in the zones under review were questioned about their level of agreement with the statements pertaining to deer hunting.

In the antler restriction zones, the average level of agreement with the statements "I am satisfied with the number of deer bucks sighted" or "I am satisfied with the number of mature deer bucks sighted" varied in the same way and increased since the inception of the management method (one hunter in four agreed in 2021 as against one hunter in six in 2016). However, more than half the hunters said they were still dissatisfied with the number of deer bucks or mature bucks sighted after the antler restriction had been in place for five years (Figure 12 and Figure 13).

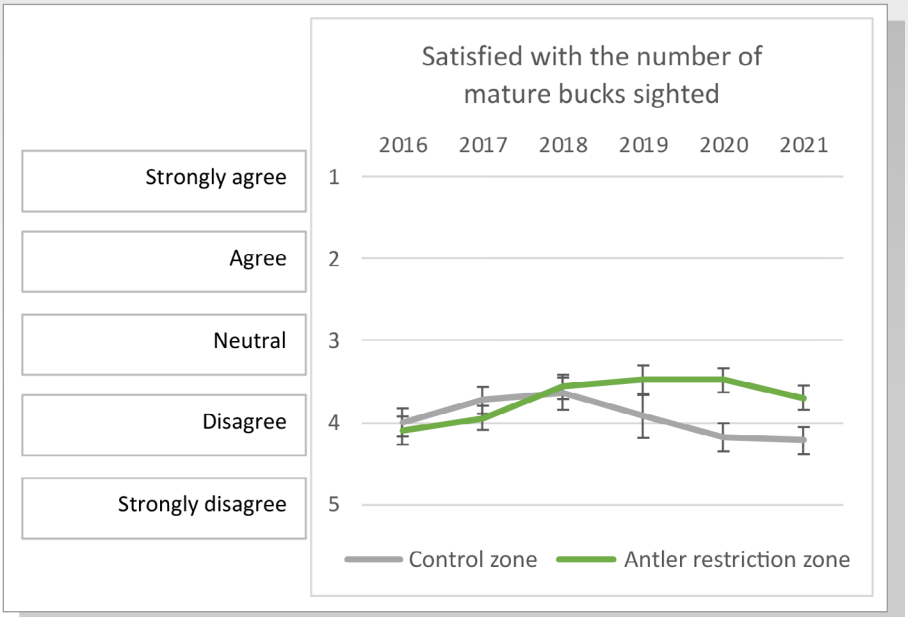


Figure 12. Average level of agreement with the statement "I am satisfied with the number of mature deer bucks sighted while hunting" among respondents to the annual survey who hunted in the antler restriction zones or the control zone (15 401 responses).

The antler restriction did not affect the hunters' level of satisfaction with respect to the number of bucks sighted, the deer harvested, or their overall hunting experience.

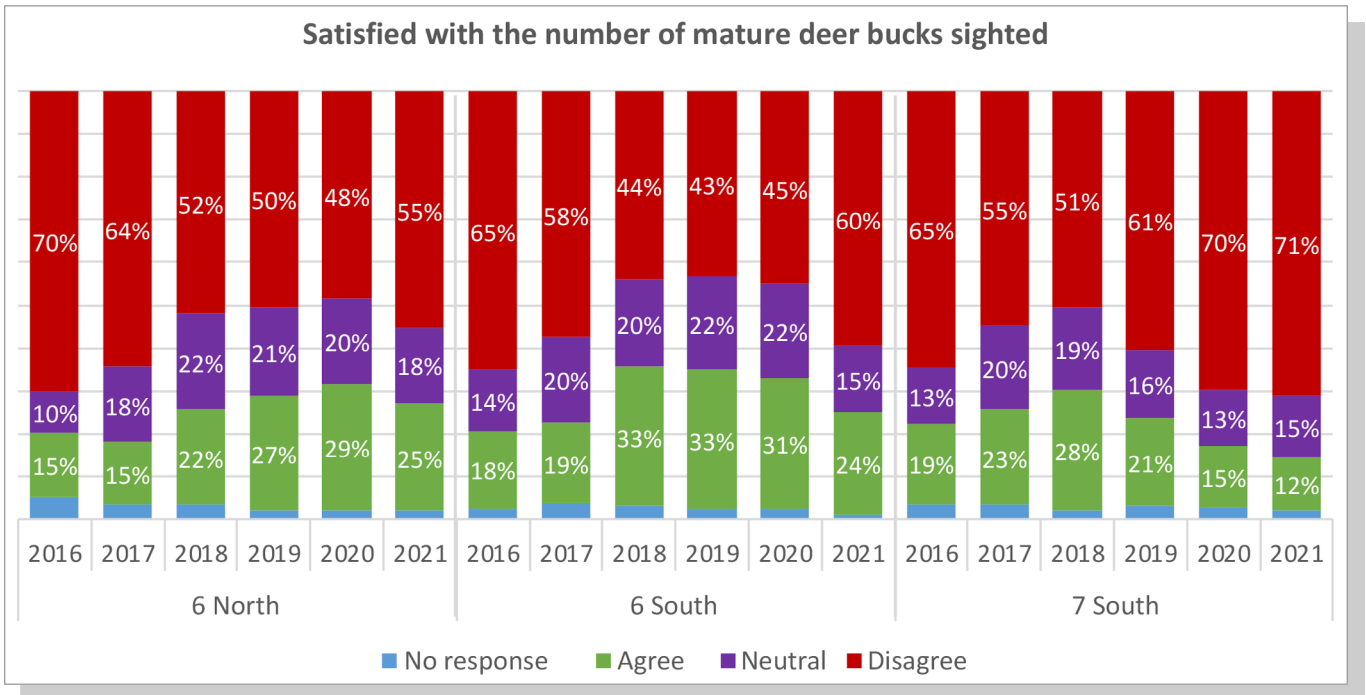


Figure 13. Proportion of the respondents to the annual survey who hunted in Zone 6 North or Zone 6 South (antler restriction) or in Zone 7 South (control zone) according to their level of agreement with the statement "I am satisfied with the number of mature deer bucks sighted while hunting" (15 401 responses).

Support for the antler restriction

Support for the antler restriction did not vary significantly over time. A majority of the hunters surveyed in the antler restriction zones and the control zone in 2016 prior to the beginning of the pilot project agreed with the application of a restriction limiting the harvest of bucks to those with three or more points on one side of the antlers (57% in the three zones) (Figure 14 and Figure 15). Support remained high in 2021, i.e., roughly 67%, both in the antler restriction zones and in the control zone (Figure 14 and Figure 15). The hunters had an opinion on the antler restriction and experience did not alter it.

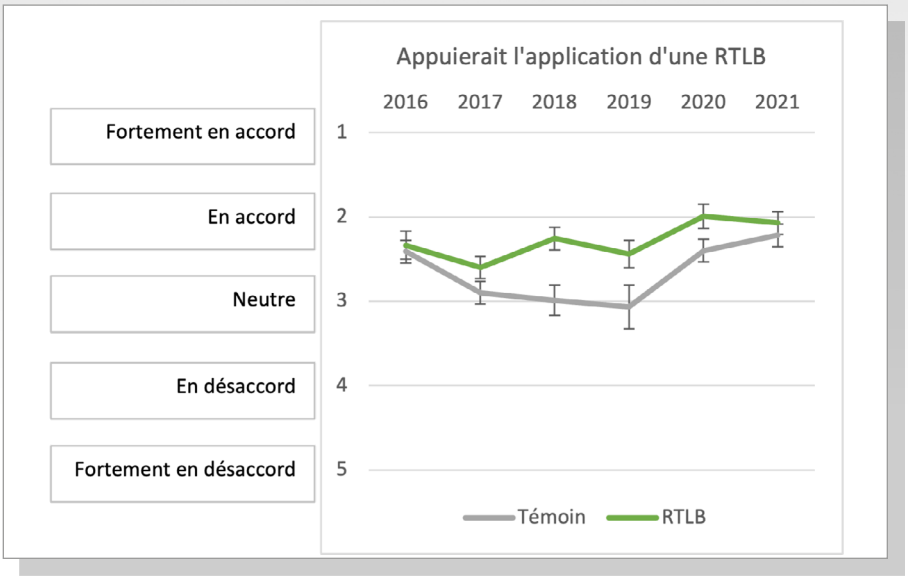


Figure 14. Average level of agreement with the statement "I am in favour of the application of an antler restriction (three or more points on one side of the antlers) in the zone where I most often hunt deer" among respondents to the annual survey who hunted in the antler restriction zones or the control zone (15 554 responses).

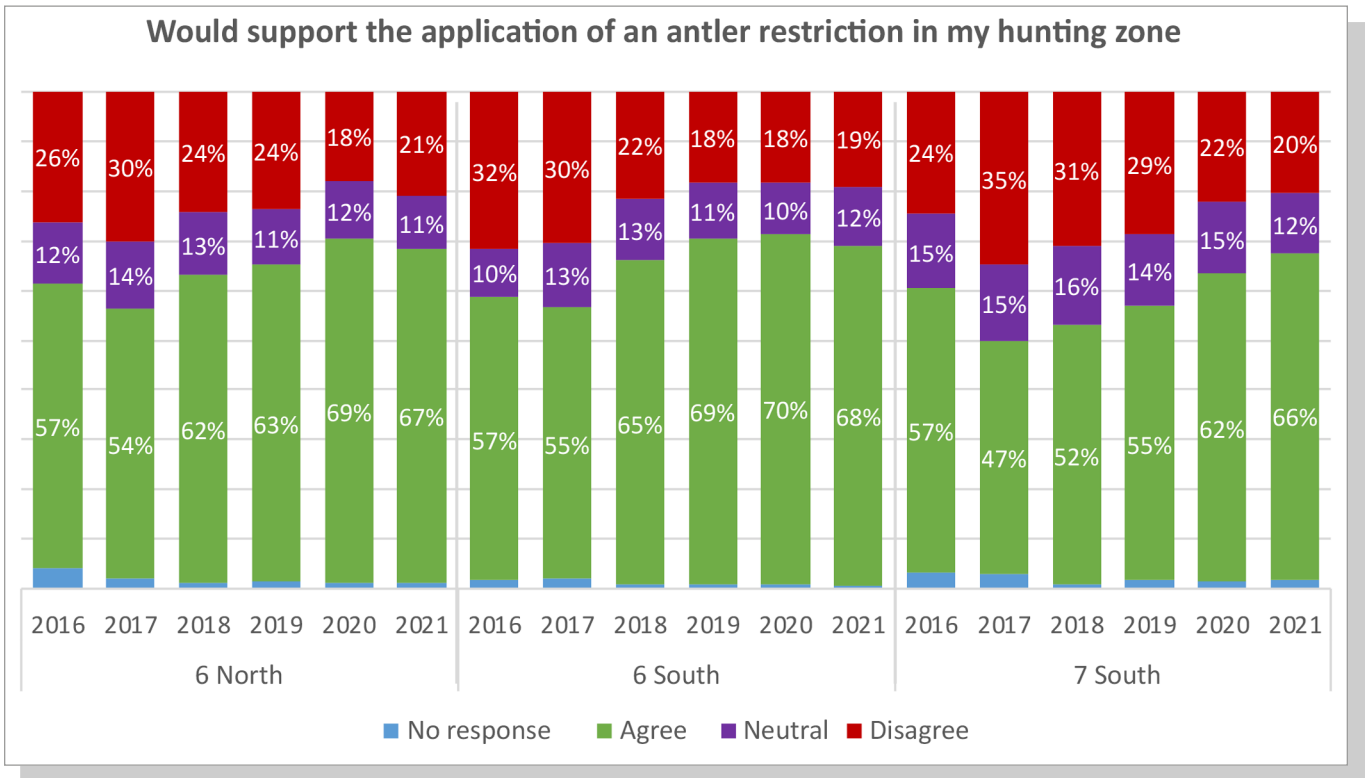


Figure 15. Proportion of the respondents to the annual survey who hunted in Zone 6 North or Zone 6 South (antler restriction) or in Zone 7 South (control zone) according to their level of agreement with the statement "I am in favour of the application of an antler restriction (three or more points on one side of the antlers) in the zone where I most often hunt deer" (15 554 responses).

Summary

Various observations arise on the impacts of an antler restriction tested for five years in a region with a high density of deer located on the northern boundary of the white-tailed deer's distribution area, where the populations are greatly affected by winter climatic conditions (Table 3).

Table 3: Summary of the key factors studies by the pilot project according to whether or not they were significantly affected by the antler restriction.

The antler restriction:	The antler restriction did not:
✔ excluded from hunting the majority of one-and-a-half-year-old deer bucks and nearly half of those two and a half years old;	× alter the characteristics of bucks of a given age;
✔ Shifted by one year the majority of the harvest of males since those protected by the antler restriction were mainly harvested at the age of two and a half or three and a half years;	× cause variations in the size of deer populations;
✔ reduced the harvesting of adult bucks and, therefore, hunting for this segment;	× increase the number of deer bucks or does sighted during hunting;
✔ increased the antlerless deer harvest;	× modify the buck:doe ratio that hunters observed;
✔ increased the proportion of hunters who expressed satisfaction with the number of deer bucks or mature bucks sighted even though more than half the hunters remain dissatisfied in this respect.	× modify the proportion of gestating females or the number of fawns produced;
	× modify the conception period;
	× increase the fawns' weight in the fall;
	× modify overall hunting success;
	× affect the hunters' level of satisfaction with respect to the number of bucks sighted, the deer harvested, or their overall hunting experience;
	× alter support for the management method.

As expected, the exclusion from hunting of the majority of deer one and a half years old and nearly half of those two and a half years old made it harder to harvest a buck. However, overall success was maintained through an increase in the harvest of does and fawns, and the high densities of deer in the antler restriction zones that allocated greater numbers of antlerless deer hunting licences by random draw.

No biological impact of the antler restriction has been demonstrated and this management method's impact has primarily been social. Even though the number of deer bucks sighted by the hunters in the antler restriction zones did not vary significantly during the pilot project, greater numbers of them expressed satisfaction in this respect in recent years. However, more than half the hunters are dissatisfied.

Even if the antler restriction does not appear to have fully met the expectations of the majority of hunters who tested it from the standpoint of the number of deer bucks sighted, support for the management method has not varied significantly over time and has remained high, even in the control zone. The hunters had an opinion on the antler restriction before its inception and their experience of the management method did not alter it.

The conclusions of the pilot project tally with what has been observed in the northeastern American states that tested an antler restriction.

Acknowledgements

Many people collaborated to carry out the antler restriction pilot project. Our thanks to the staff who participated in field work, the roadkill salvagers who gave us access to deer killed in highway collisions, the managers of registration stations and butcher's shops who welcomed us, and all the hunters who responded to the survey or allowed for the deer that they harvested to be measured. We also thank the Service de consultation statistique de l'Université Laval for the data analysis.