

White-tailed Deer: A Review of the 2010 Provincially Coordinated Hunting Regulation

White-tailed deer in BC were managed using a combination of General Open Season (GOS) and Limited Entry Hunt (LEH) regulations from 1987-2009. In the fall of 2010, provincially-coordinated regulations were introduced to liberalize hunting opportunity for white-tailed deer in response to their increasing abundance (Figure 1) and expanding distribution (Aldous 2013, Shackleton 2013). All LEH regulations were eliminated and GOS's were implemented for any buck and antlerless white-tailed deer, where populations were abundant. This included all of the Thompson, Okanagan and Kootenay Regions as well as the southern portions of the Omineca and Peace Regions (Figure 2).

1) What were the management objectives for the provincially-coordinated white-tailed deer regulation?

Management objectives for the provincially-coordinated regulation were to increase hunter opportunity, by including more GOS days and increasing hunter numbers, while maintaining sustainable harvest of white-tailed deer.

2) What is the current distribution of white-tailed deer in BC and how have their numbers changed?

White-tailed deer have expanded their distribution in recent decades (Aldous 2013, Shackleton 2013) and now occur throughout much of the province. Estimated abundance of white-tailed deer in British Columbia increased from about 40,000 in 1987 to over 113,000 in 2011 (Figure 1). Populations declined following the severe winter of 1996/97 but increased in size and distribution since then (Mowat and Kuzyk 2009, Kuzyk et al. 2013). The southeast and northeast parts of the province traditionally had the highest abundance of white-tailed deer, although in the late 2000s white-tailed deer abundance increased throughout the south-central interior of the province and has continued to expand to new areas (Figure 2). The increased abundance and distribution of white-tailed deer have been associated with their ability to co-exist with human development and use landscapes altered by agriculture, forestry and forest fires.

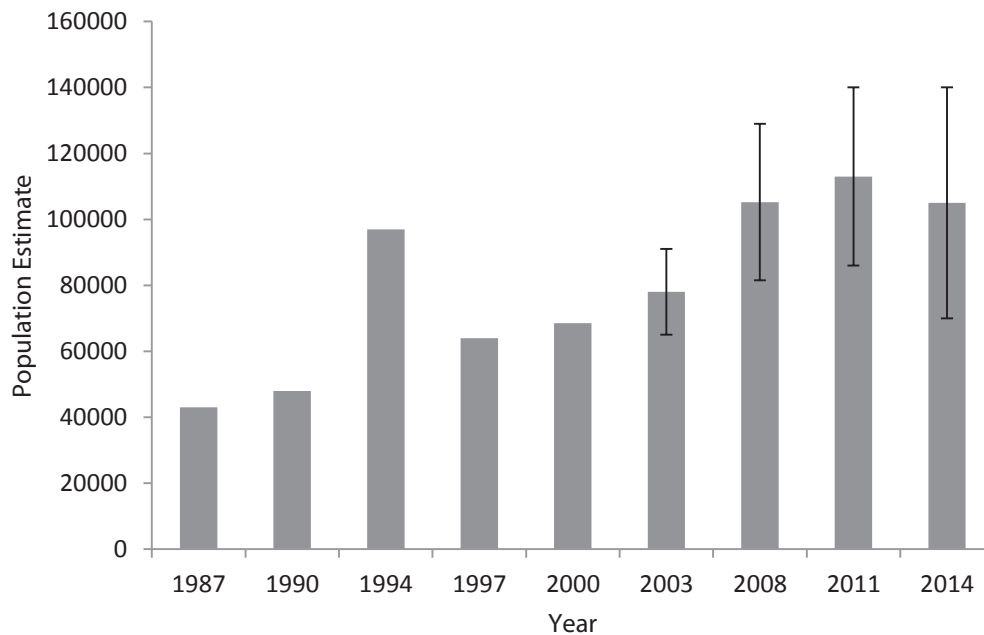


Figure 1: White-tailed deer population estimates in British Columbia from 1987-2014. Estimates were derived from inventories, population modeling and expert opinion. Error bars represent the minimum and maximum population estimates expected.

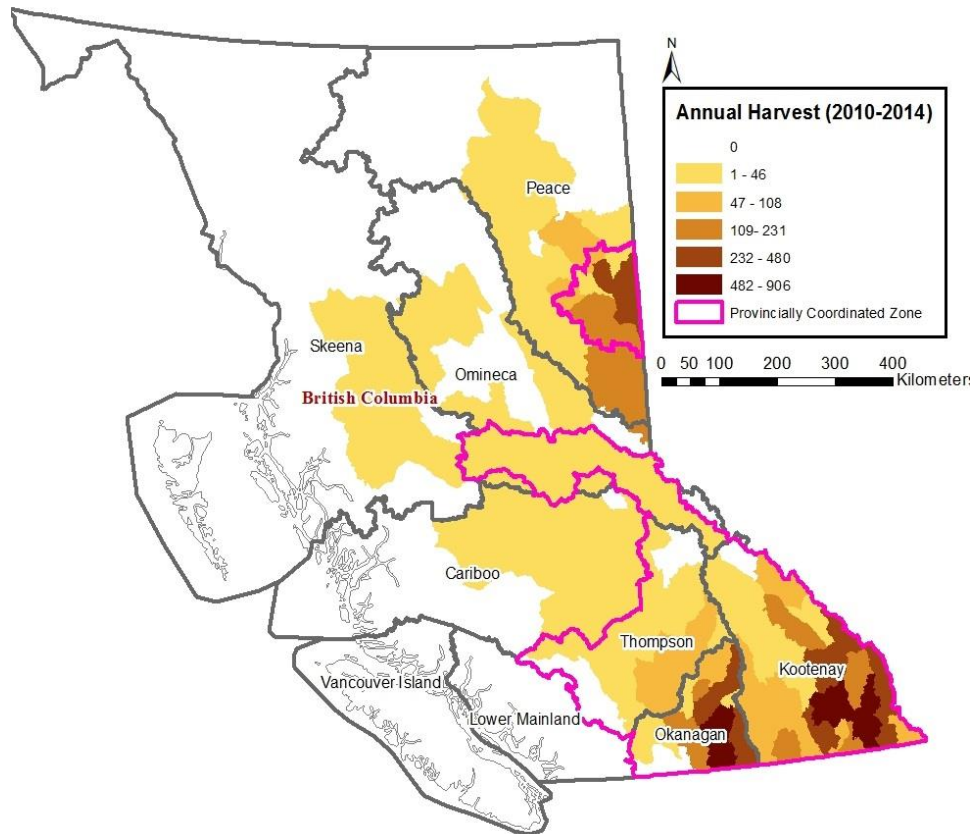


Figure 2: Average annual white-tailed deer harvest per Management Unit from 2010-2014. Data originate from the provincial hunter survey.

3) How are wildlife staff monitoring the impact of current regulations to white-tailed deer populations?

When evaluating regulations, harvest procedures recommended multiple lines of evidence be examined that could indicate performance measures are not being met. These include:

- a) successive population surveys (i.e. repeat surveys over a year or number of years);
- b) a big game stock assessment (analysis of population and hunter harvest information); and
- c) reliable field observations from a variety of sources.

To monitor the provincially-coordinated white-tailed regulation, wildlife staff have been using a combination of 1) tracking licensed harvest information from the provincial hunter survey, 2) limited population surveys 3) reliable field observations from a variety of sources and 4) winter severity as it is considered to be one of the most important factor limiting abundance and distribution of white-tailed deer (Alberta Environmental Protection Natural Resources Service 1995). Winter severity indices are used to predict changes in white-tailed deer populations in some portions of the province (Baccante and Woods 2010). These measures include absolute buck and antlerless harvest, proportion of antlerless deer in the harvest, hunter success (i.e., the proportion of hunters who harvested a deer) and hunter effort (i.e., the number of days required to harvest a deer). Regions 8, 7b and 4 have used ground counts as an index of relative change in abundance.

4) How did harvest change after implementation of the provincially coordinated white-tailed deer regulation?

Harvest generally tracked population size through the implementation of the provincially-coordinated regulation from 1987-2014 ($r = 0.83$ (Figure 3); $\bar{x} = 8,250$; $SD = 2,101$) (Figure 4). The liberalized regulation in 2010 appeared to have increased provincial antlerless harvest, but the buck harvest remained at or below 1990 levels. This may have been due in part to the elusive nature of white-tailed bucks especially during hunting seasons. Van Etten et al. (1965) found it took hunters about 18 hours to locate white-tailed bucks during controlled hunts in a one-mile square fenced enclosure.

Regionally, antlerless harvest increased in Regions 3, 7B and 8 in 2010 but did not change in Region 4. Antlerless bag limits were increased to 2 in Regions 3 & 4 in 2012, which caused a substantial increase in harvest in Region 4 but very little change in Region 3 (Figure 5). Antlerless harvest appears relatively stable post-regulation change in Regions 3 and 8, while Regions 7A and 7B show a declining trend in antlerless harvest after 2010. Buck harvest has increased since 2010 in Region 3, remained stable in Region 8 and declined in Regions 4, 7A and 7B (Figure 5).

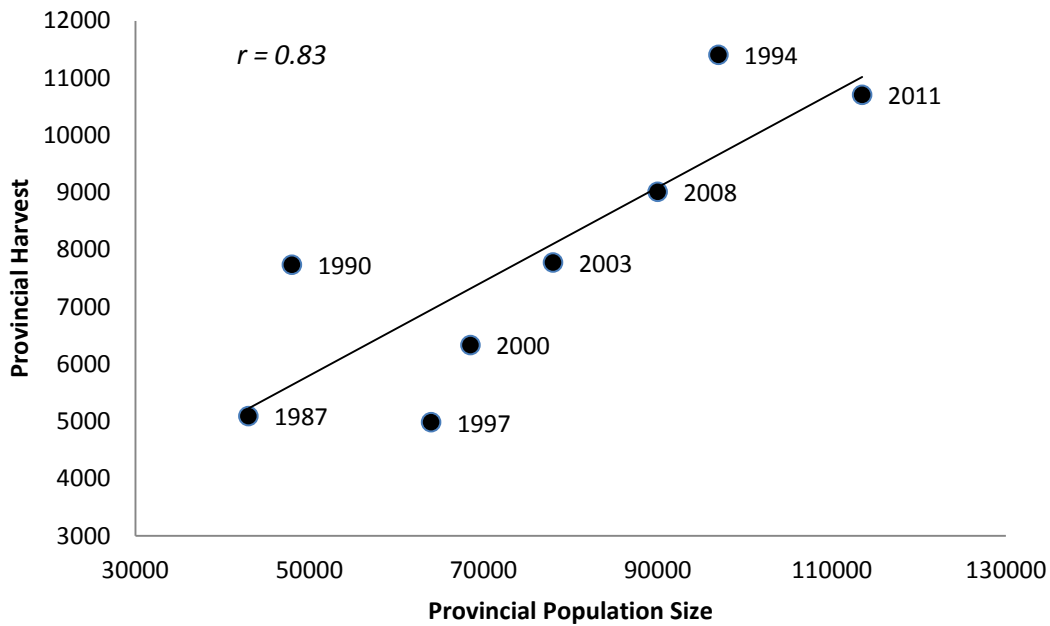


Figure 3: Scatterplot of the provincial white-tailed deer harvest, relative to the estimated provincial population size of white-tailed deer in BC from 1987-2011. Data originate from the provincial hunter survey with data labels indicating year.

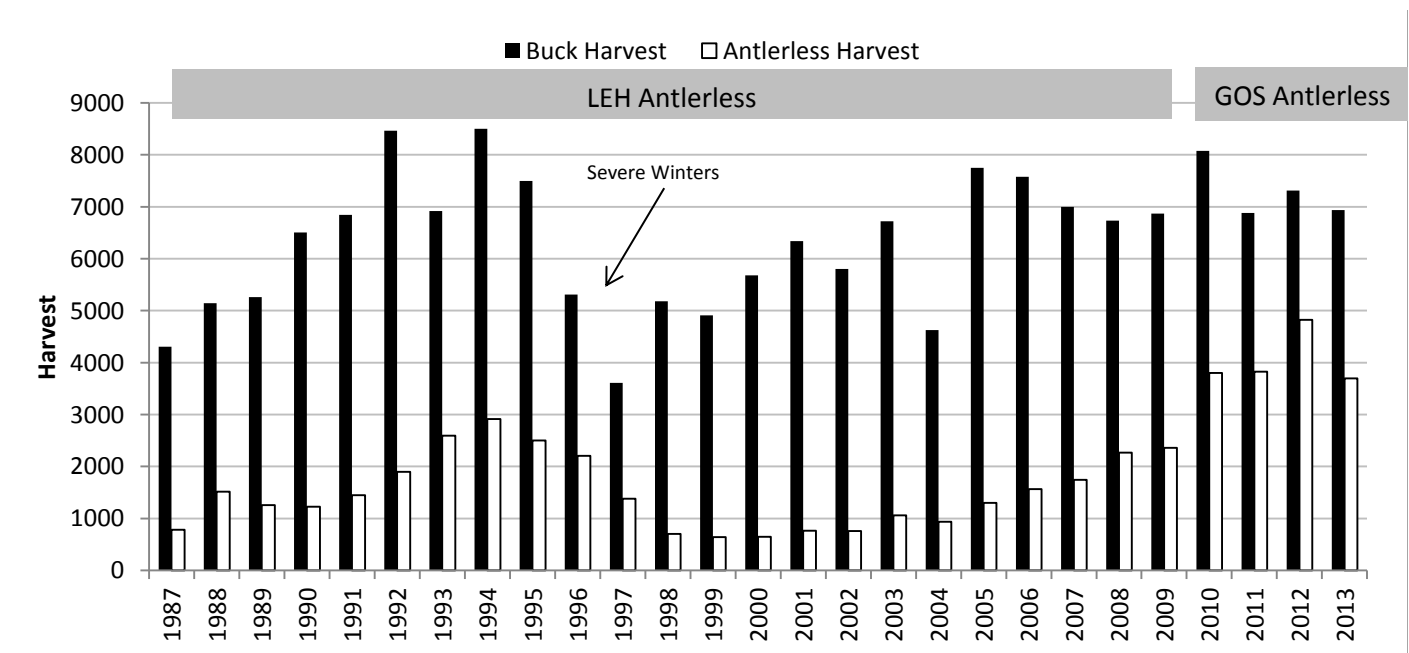


Figure 4: Provincial white-tailed deer harvest, 1987-2013. Provincially coordinated antlerless and any-buck regulations were implemented in Regions 3, 4, 8, and portions of Region 7A and 7B in 2010. Data originate from the provincial hunter survey.

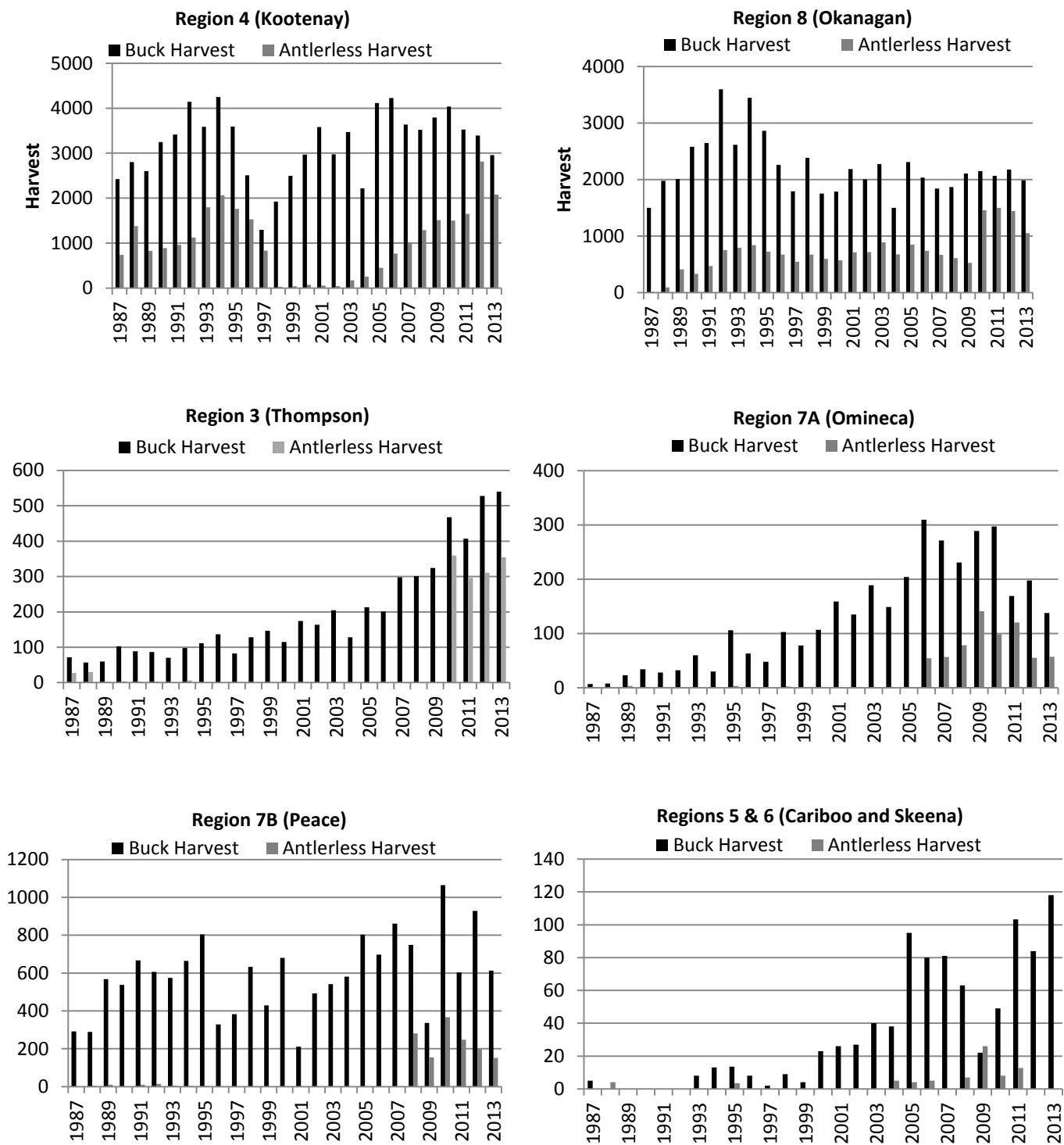


Figure 5: White-tailed deer harvest by Region, 1987-2013. Provincially coordinated antlerless and any-buck regulations were implemented in Regions 3, 4, 8, and portions of Region 7A and 7B in 2010. Data originate from the provincial hunter survey.

5) How did harvest rate change and are current harvest rates sustainable?

Provincial white-tailed deer harvest rates were calculated for bucks and antlerless combined as regional population estimates did not separate buck and antlerless estimates. Harvest rates were 9.3% prior to the provincially-coordinated regulation (2008 and 2009) and 10.4% in 2010, having a 2.1% increase in harvest (Figure 6). The

greatest increase after implementation occurred in Regions 3, 8 and 7B. Harvest rate did not increase in Region 4 until 2012, when the antlerless bag limit was increased to 2. Harvest rates varied among MUs, with the highest harvest rates occurring in areas with extensive road networks and high hunting pressure. These harvest rates are well within ranges found to be sustainable in other jurisdictions (Mackie et al. 1998). Sustainable harvest rates needed to maintain stable populations depend on fawn recruitment and natural (non-hunting) mortality rates of adult females. In mountain ecosystems in northwest Montana, a 23% antlerless harvest rate maintained stable populations during periods of high fawn ratios (85 fawns:100 does; Mackie et al. 1998). When fawn ratios were lower (50-67 fawns:100 does), sustainable doe harvest rates were estimated to be between 6 and 13%. Density dependant increases in fawn production may occur with increasing harvest rates in productive habitats (Mackie et al. 1998).

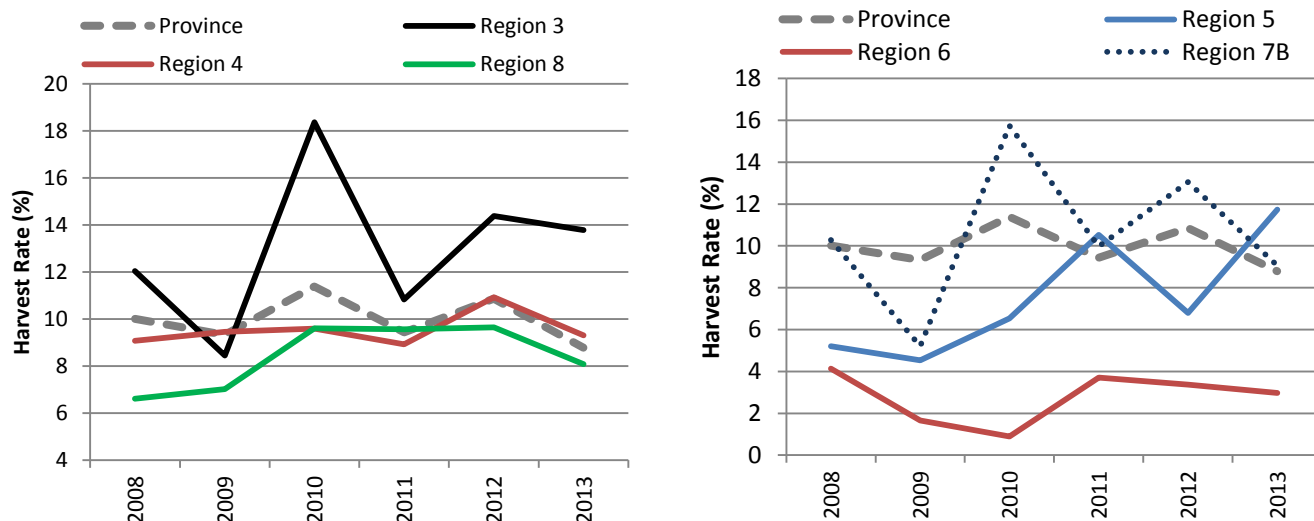


Figure 6: Estimated provincial and regional white-tailed deer licensed harvest rates (bucks and antlerless combined), 2008-2013. Harvest rates were calculated using regional population estimates and harvest estimates from the provincial hunter survey. Regional and provincial population estimates were used in 2008, 2011 and 2014. The population estimate trendline was used to estimate population size for years when estimates were not available. Harvest rates are not shown for Region 7A due to uncertainty with estimates.

5) What are the results of ground surveys for white-tailed deer?

Since the antlerless regulation was implemented in 2010, ground surveys in Region 8 suggest that populations are stable and not affected by increased hunter harvest from the provincially coordinated regulation. Independent counts conducted by local sportsman, ranchers and regional wildlife biologists observed initial decreases ranging from 25–30%, but both surveys are showing increasing numbers of white-tailed deer (Figures 7 & 8). Most recent counts were approaching or exceeding counts conducted prior to implementation of provincially coordinated regulation in 2010. Spring counts conducted on designated transects in the West Kootenay (MU 4-08) found an increase in white-tailed deer observations after a wildfire in 2007 (Figure 9), when deer were concentrated along the outer edge of the burn and more detectable. Survey data do not suggest a change in detection trend following implementation of the antlerless GOS in 2010.

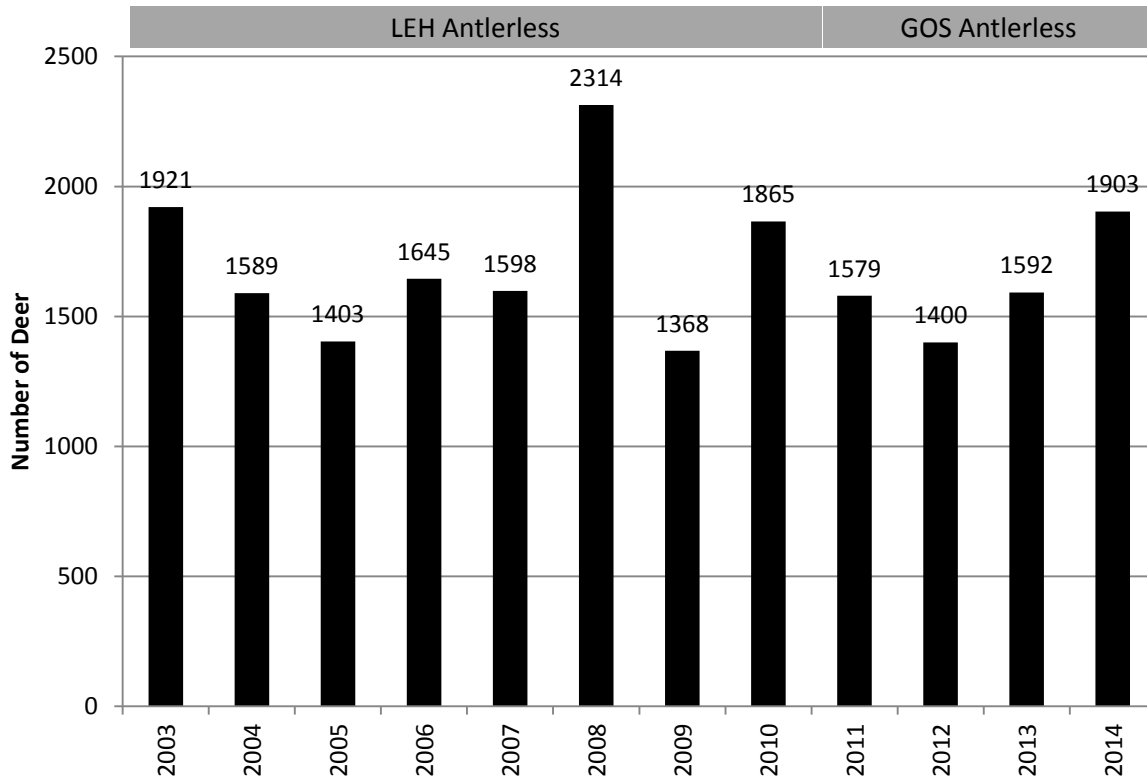


Figure 7: White-tailed deer spring ground counts in Management Units 8-12 and 8-14 from 2003-2013. This count is conducted by local sportsmen and ranchers from Johnstone Creek to the Village of Midway and up the Kettle River Valley.

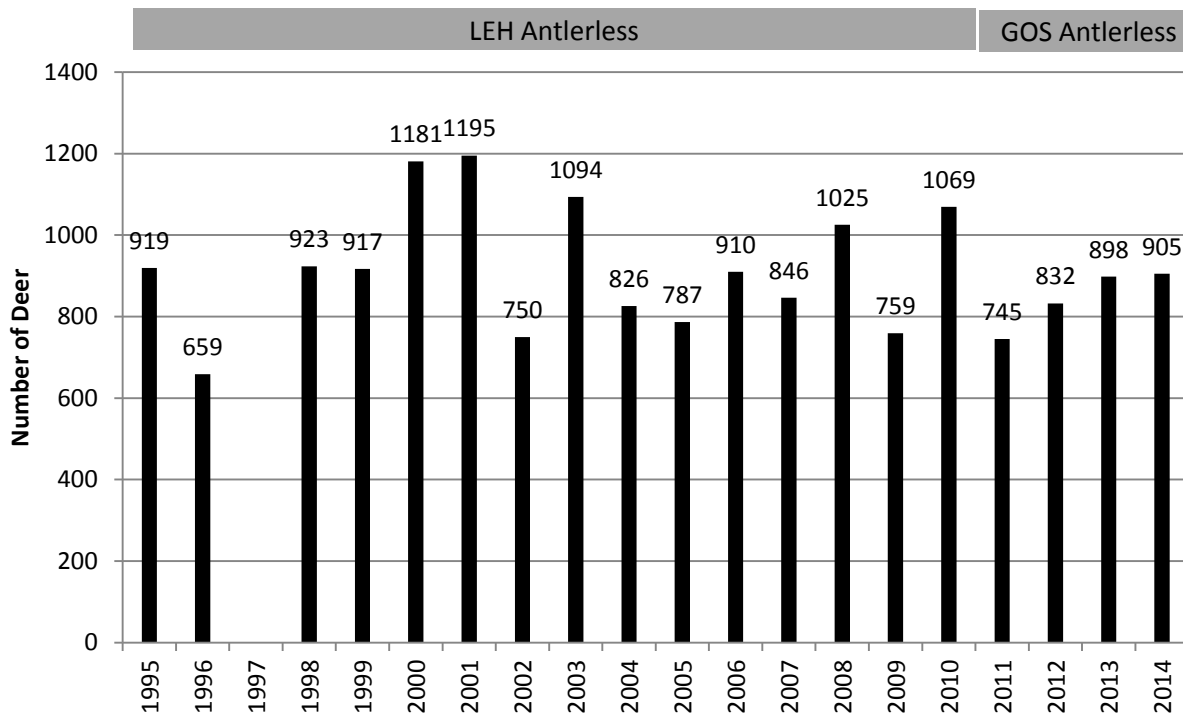


Figure 8: White-tailed deer spring ground counts in Wildlife Management Unit 8-12 from 1995-2013. This count is conducted annually by regional wildlife biologists in the Christian Valley.

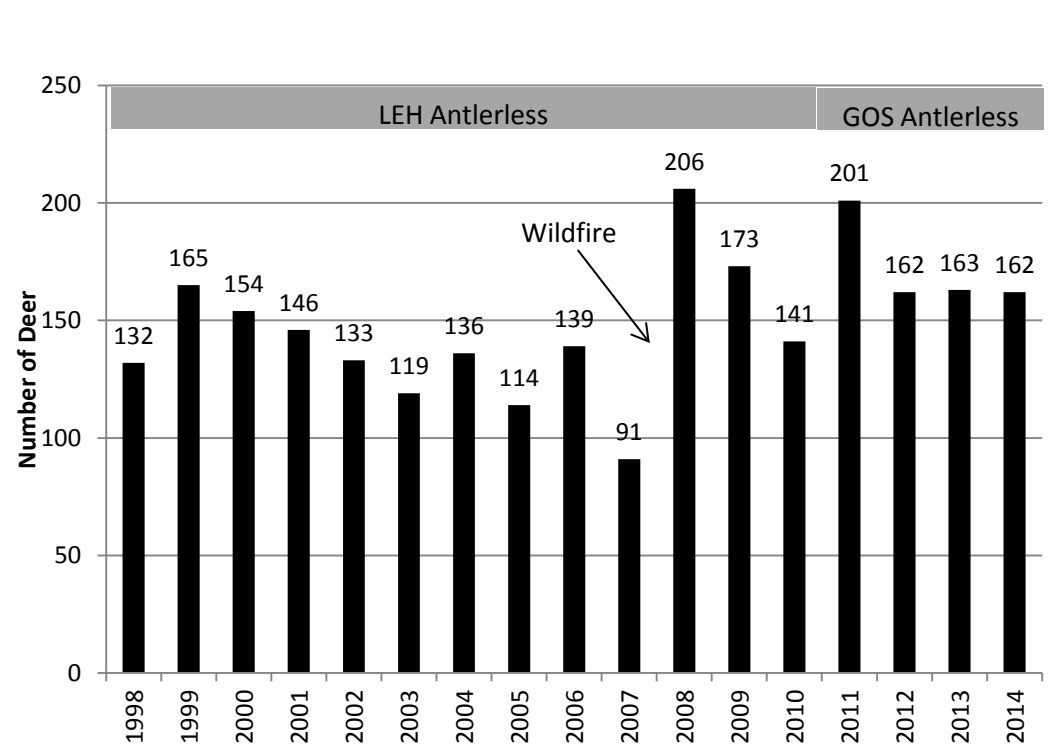
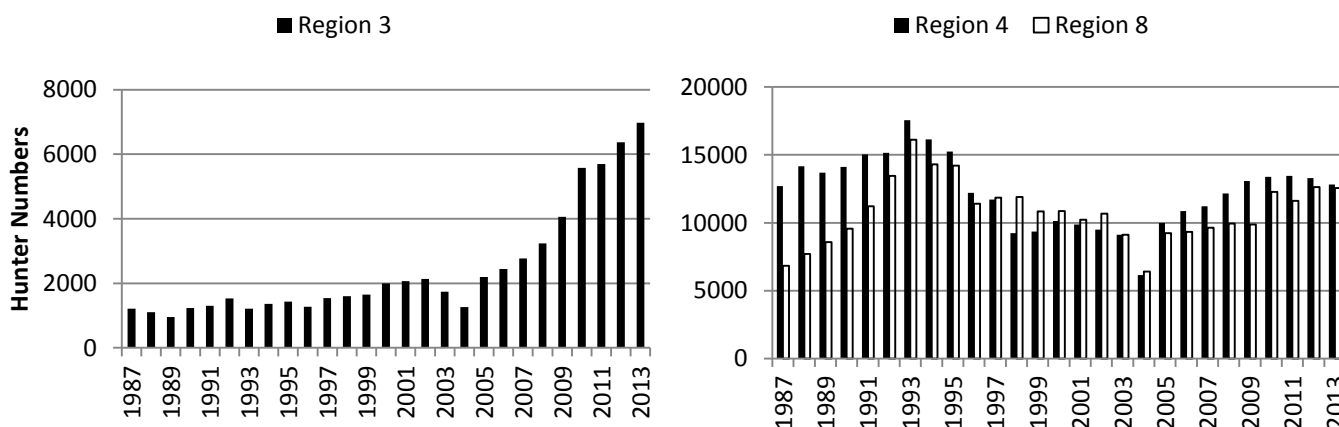


Figure 9: Peak number of white-tailed deer counted in one night on designated transects in the Pend d'Oreille Valley (Management Unit 4-08), 1998-2014. Counts are conducted in early April by the Fish and Wildlife Compensation Program.

6) How have hunter numbers, license sales and hunter success changed after provincially-coordinated regulations were implemented?

In 2010, provincial white-tailed deer hunter numbers increased by 14% from the 2005-2009 average (Figure 10) and hunting license sales increased by 30% (Figure 11). Regions 3, 7B and 8 had the greatest increase in hunter numbers, while Regions 4, 7A, 5 and 6 showed a small increase in hunters. Hunter success increased slightly in Regions 3 and 4 in 2010 (Figure 12). There was not a substantial change in hunter success in Region 8 from 2010-2013. The number of kills per 100 hunter days (i.e., catch per unit effort) increased in Region 3 but decreased in Region 7 after the provincially coordinated regulation was implemented (Figure 13). Regions 4 and 8 do not show a substantial change in kills per 100 hunter days after the regulation change.



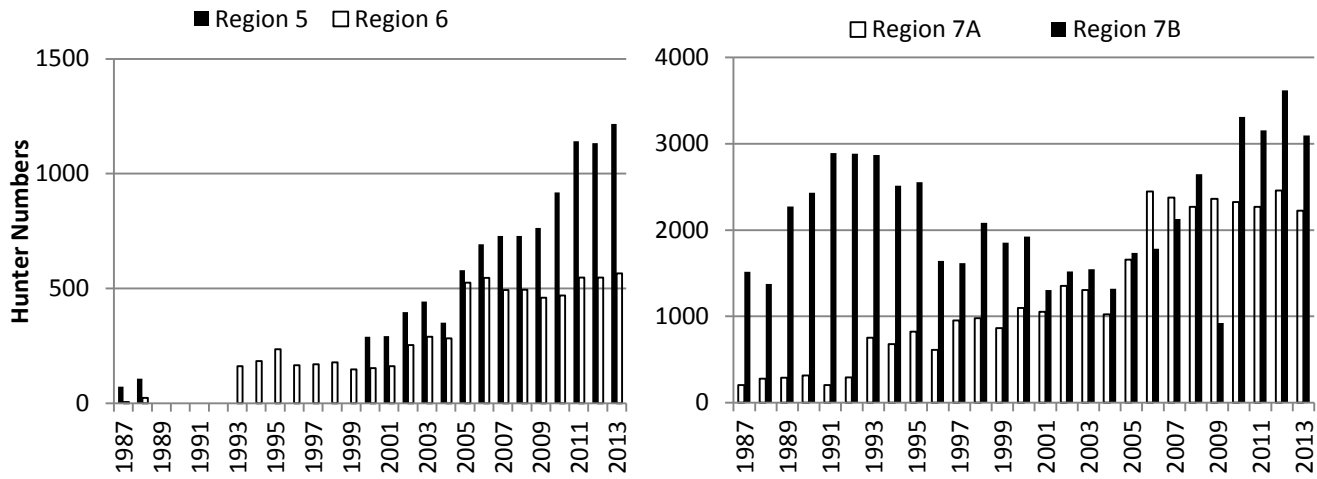


Figure 10: White-tailed deer hunter numbers by region, 1987-2013. Provincially coordinated white-tailed deer regulation were implemented in 2010 in Regions 3, 4, 8, and portions of Region 7A and 7B. Data originate from the provincial hunter survey.

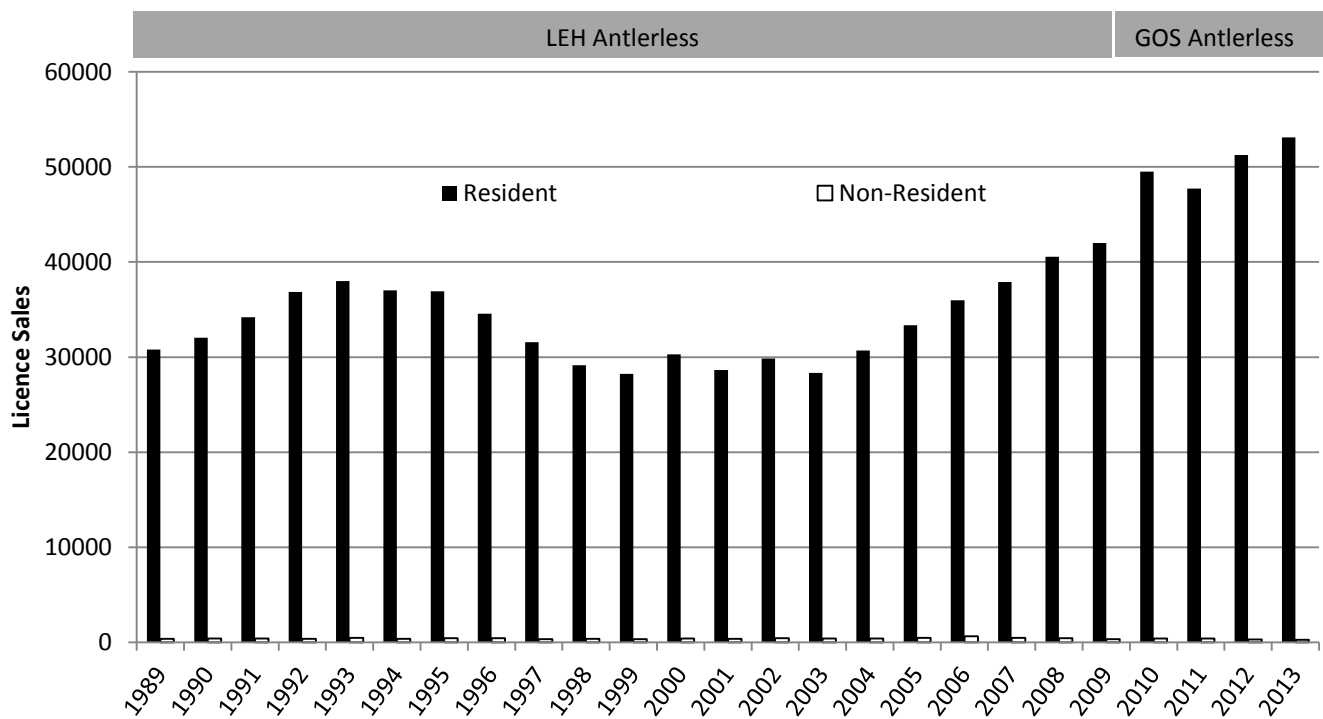


Figure 11: Resident and non-resident white-tailed deer license sales in British Columbia from 1989-2013.

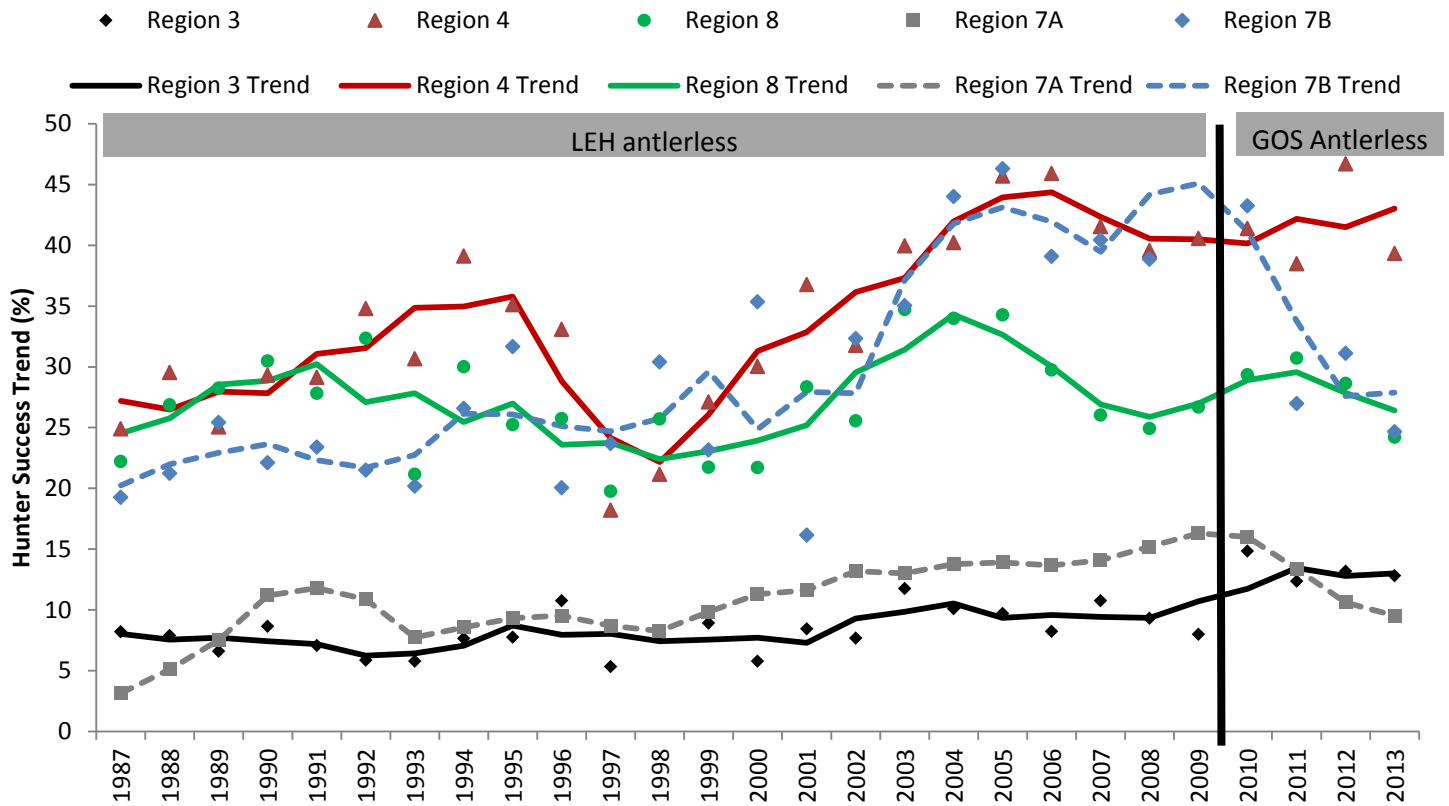


Figure 12: White-tailed deer hunter success (percent of hunters who harvested a deer) by region, 1987-2013. Provincially coordinated white-tailed deer regulation were implemented in 2010 in Regions 3, 4, 8, and portions of Region 7A and 7B. Data originate from the provincial hunter survey.

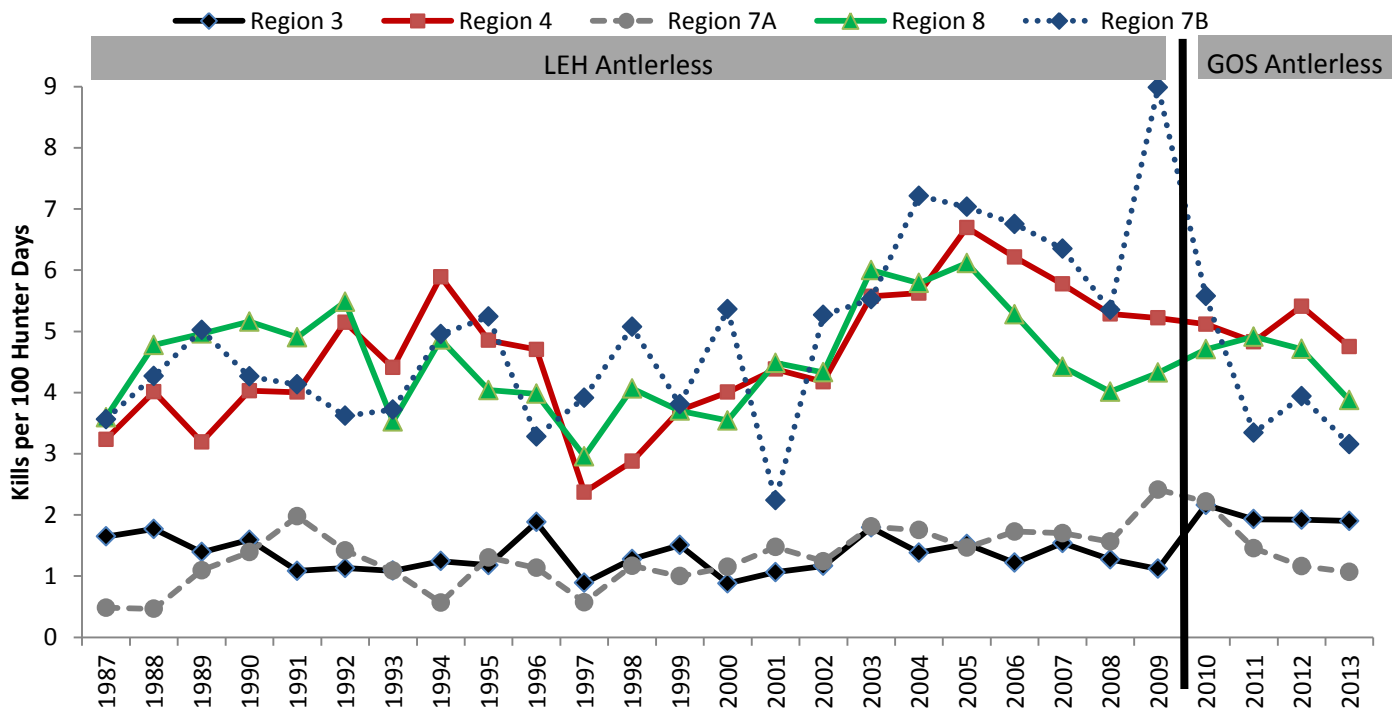


Figure 13: White-tailed deer harvest per 100 hunter days (i.e., catch per unit effort) by Region, 1987-2013. Provincially coordinated white-tailed deer regulations were implemented in 2010 in Regions 3, 4, 8, and portions of Region 7A and 7B. Data originate from the provincial hunter survey.

7) Were the objectives of increasing hunter opportunity and increasing hunter numbers while maintaining sustainable harvest of white-tailed deer met?

Based on the definition of hunting opportunity provided above, it appears the antlerless GOS has increased opportunity in regions 3, 4 and 8 but not Region 7A (Table 1). Hunter numbers and harvest increased in Region 7B, while hunter success declined, which could be attributed to declining populations over this period. Harvest rates were sustainable; however harvest may be limiting population growth in specific MUs where hunting pressure and road densities are high.

Table 1: Comparison of regional white-tailed deer harvest statistics preceding and following implementation of provincially coordinated regulation. Shaded cells refer to numbers that increased (green) or decreased (red).

Region	Number of Buck GOS Days		Number of Antlerless GOS Days		Average Hunter Numbers		Average Hunter Success (%)		Average Harvest (Antlered and Antlerless)	
	2009	2010-2013	2009	2010-2013	2006-2009	2010-2013	2006-2009	2010-2013	2006-2009	2010-2013
3	92	92	0	22	3,127	6,156	9	13	281	816
4	82	82	0	22	11,829	13,233	27	28	4,940	5,490
7A	82	82	11 [♦]	22	2,364	2,320	15	12	358	283
7B	56 ^{**}	82	30 [*]	22 [*]	1,871	3,297	43	31	770	1,042
8	76	82	0	22	9,700	12,276	27	28	2,600	3,456

[♦]Restricted to private land in certain MUs

^{*}Restricted to Agriculture Zone

^{**}4-point or greater regulation

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