



JUL 15 2016

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Summary of Bathurst and Bluenose-East caribou herd survey results

I have enclosed two reports that summarize the results of reconnaissance surveys carried out this spring 2016 on the Bathurst and Bluenose-East caribou herds.

The Survey Process:

In 2015, Environment and Natural Resources (ENR) conducted calving ground photo surveys to determine population estimates for the Bathurst and Bluenose-East caribou herds. Photo surveys are done every three years on these two herds. In the years between photo surveys, ENR conducts reconnaissance surveys. While reconnaissance surveys are not as precise as a photo survey, they still provide a reliable indicator of changes in the size and location of the calving grounds from year to year and the number of cows on the calving grounds.

The Bluenose-East Reconnaissance Survey:

The Bluenose-East reconnaissance survey was flown between the days of June 4 – 6, 2016 under reasonable survey conditions. The same methods used in previous reconnaissance surveys were used on this survey. All 36 of the caribou cows with radio-collars were found within the area that was surveyed. Compared to the 2015 reconnaissance survey, the breeding cows were much more tightly grouped into a small area, with very few caribou in the surrounding areas. Large numbers of animals in a small area make it more difficult to accurately count them without taking photographs. The total number of adult caribou on the Bluenose-East core calving ground was estimated at about 18,500 animals; however the precision of this estimate is relatively low.

Since 2010, the number of Bluenose-East caribou counted on the calving grounds and the number of areas on the calving grounds with large densities of caribou have declined. The 2016 reconnaissance survey suggests that the Bluenose-East herd has continued to decline, however this should be interpreted with caution due to the low level of precision in the estimate.

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The Bathurst Reconnaissance Survey:

The Bathurst caribou herd reconnaissance survey was flown on June 7 and 8th, 2016, using similar methods to those used in previous reconnaissance surveys. Because the core calving area of the Bathurst herd has become very small, the transect lines in the core calving area were spaced closer together (2.5 kilometers apart) than previous reconnaissance surveys to ensure good coverage of the core calving area. Conditions for the survey of the core calving area were excellent but conditions for surveying the areas around the core calving area were poor. All 27 of the caribou with radio collars were found within the core survey area, with virtually no animals found outside the core area. Compared to the 2015 survey, caribou were found much more tightly grouped in a much smaller area. The size of the core calving area was about 40% of the core calving area in 2015.

Similar to the results of the Bluenose-East caribou herd reconnaissance survey, the high density of animals in a small area makes it difficult to accurately count the number of animals without taking photographs, resulting in an imprecise estimate. The estimate of adult caribou on the Bathurst core calving grounds was about 10,500. Compared to the 2015 reconnaissance survey estimate, this suggests an increase in the number of animals on the core calving grounds. However, because the 2016 estimate has low precision it should also be interpreted with caution because of the decrease in the core calving ground size, the tight concentration of animals on the calving grounds and the very low densities of caribou (including non-breeders) outside the core calving area.

Should you have any questions please contact your local or regional ENR office.

Sincerely,

A handwritten signature in blue ink that reads "Ernie Kelly for".

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Summary of the 2016 Bluenose-East caribou herd reconnaissance survey

June 30, 2016

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Introduction

The following report provides a summary of the recent 2016 Bluenose-East reconnaissance survey. It is meant to provide a timely synopsis of survey results to inform current conservation measures being taken for the Bluenose-East caribou herd.

Methods and Results

The Bluenose-East core calving ground was flown on June 5th and peripheral areas were flown on June 4th & 6th 2016 using methods similar to previous calving ground surveys (Nishi 2010, Adamczewski et al. 2014, Boulanger et al. 2014, Boulanger et al. 2016). Survey conditions were reasonable with mean cloud cover and snow cover of approximately 30% during the time the core area was surveyed.

As with previous surveys, transect data was summarized by 10 km segments which indicated low to medium density in all but 2 segments (Figure 1). One segment had a very high density of 49.6 caribou per km². Caribou with antlers were observed just north of the Coppermine River suggesting there may have been a trailing edge of breeding caribou in this area.

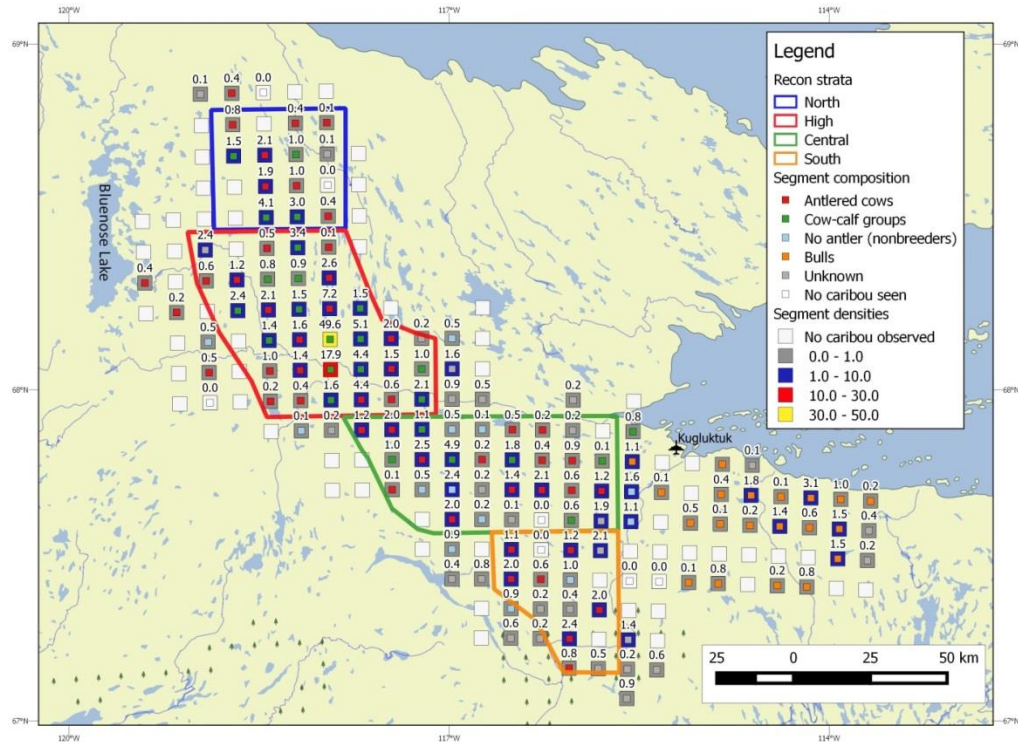


Figure 1: Survey strata, segment densities, and segment composition for the 2016 Bluenose-East survey. The segment density (caribou/km²) is listed above each segment.

The core calving area was delineated by the presence of breeding females (Figure 1). The core area was then stratified using similar methods as photo surveys to allow comparison of the distribution of caribou and accommodate the uneven shape of the calving ground area. Unlike previous years, a south stratum was included under the assumption of breeding caribou in this area. In previous years, very low to no breeding caribou were observed in the south stratum area.

The distribution of radio collared cows was well encompassed by the strata (Figure 2). Two collared cows occurred in the southern stratum which also suggested there may have been breeding caribou in this area.

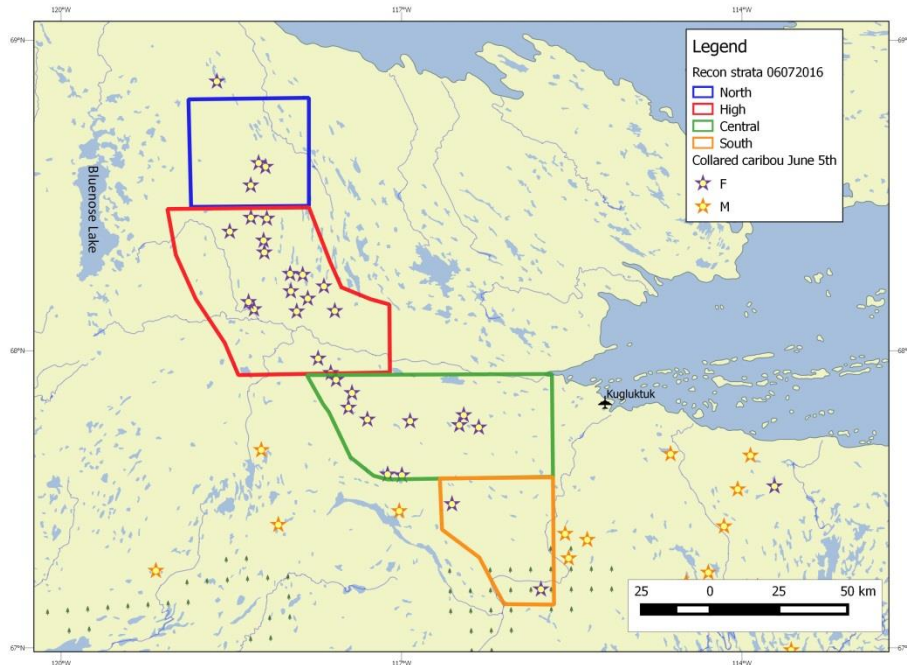


Figure 2: Survey strata, segment densities, and segment composition depicted as pie charts for the 2016 Bluenose-East survey.

One of the notable differences in 2016 was lower segment densities (compared to 2015) in most areas with the exception of one segment in the middle of the high density stratum that had a very high density of caribou ($49.6 \text{ caribou /km}^2$). Figure 3 compares the distribution of caribou between 2015 and 2016 with the size of segment bubbles proportional to density. It can be seen that the bubbles in 2016 are smaller than 2015 with the exception of the 2 segments in the 2016 high density stratum. Also, there were proportionally less non-antlered caribou in 2016 in most segments compared to 2015.

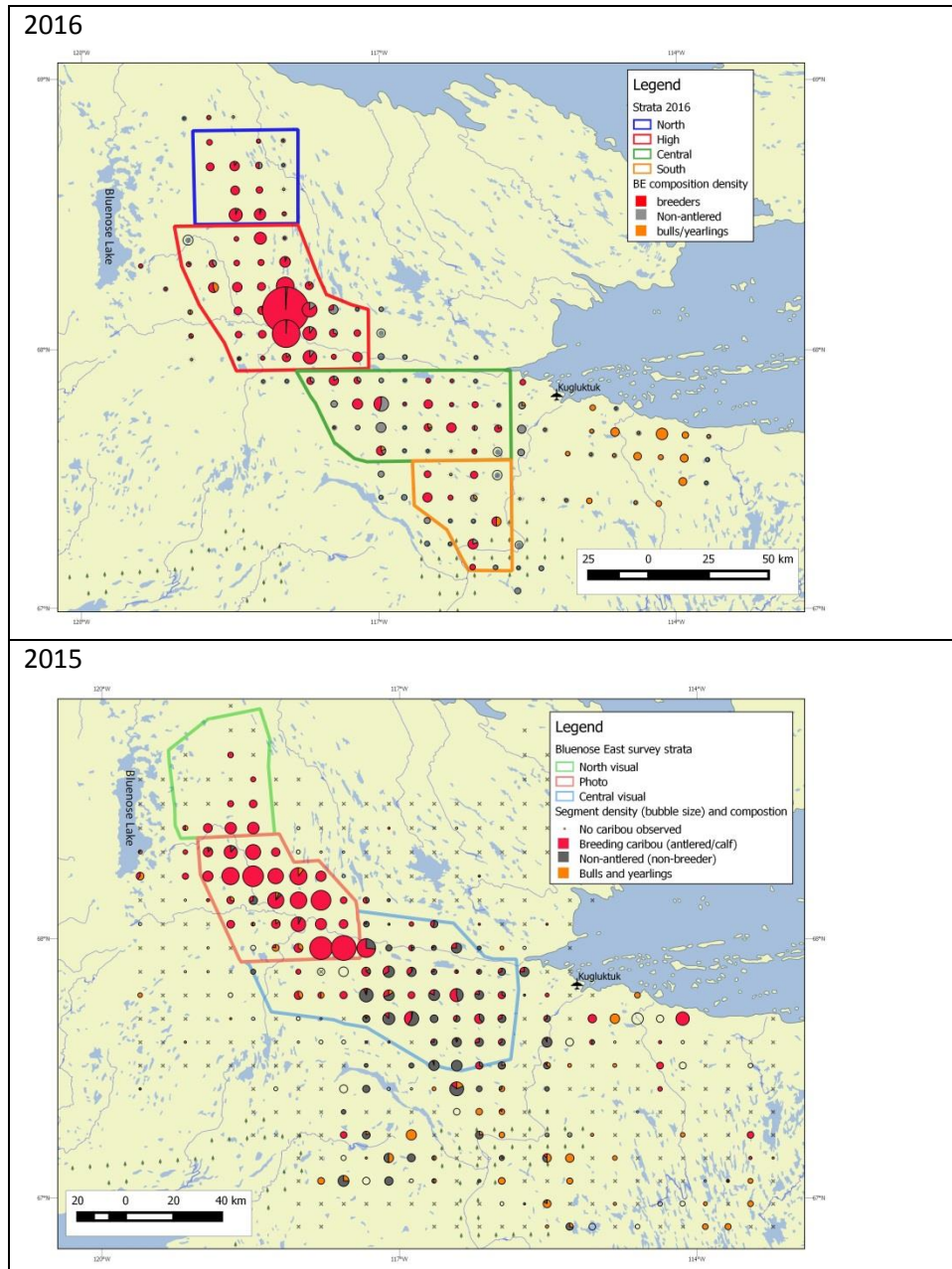


Figure 3: Survey strata, segment densities, and segment composition depicted as pie charts for the 2016 and 2015 Bluenose-East survey.

The number of caribou in each stratum was estimated using the same approach as previous calving ground surveys (Boulanger et al. 2014, Boulanger et al. 2016). Coverage was 8% for all strata. Transects were defined as the north-south lines flown during the recon survey (Table 1). The total number of 1+ year old caribou estimated within the core calving ground area was 18,536 (CI=2,850-34,211).

Table 1: Estimates of caribou in Reconnaissance strata for 2016 for the Bluenose-East caribou herd.

Strata	Strata area	Transects	Caribou counted	Density	N	SE(N)	CV
North	1625.8	4	123	1.02	1,656	667.34	40.3%
High	3474.7	8	994	3.51	12,206	6328.53	51.8%
Central	3062.5	9	250	1.02	3,111	696.05	22.4%
South	1597.9	4	119	0.98	1,563	336.65	21.5%
Total			1486		18,536	6410.418	34.6%

Estimates were imprecise due to the high degree of aggregation in the high density stratum. Basically, the majority of caribou were counted on a single north-south transect line (Figure 4). As with the Bathurst herd, aggregation causes large differences in transect densities which reduces estimate precision especially when coverage is low.

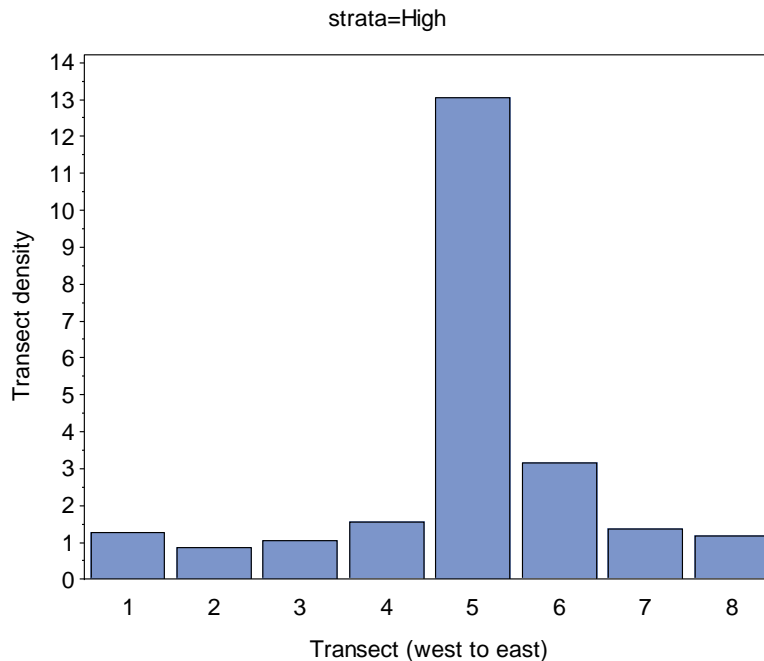
**Figure 4: Transect densities in the high density stratum.**

Figure 5 compares the 2016 estimate to previous reconnaissance estimates for the Bluenose-East herd. The lower precision of the 2016 estimate is indicated by the larger confidence interval. The ratio of the 2016 to 2015 estimates was 0.92 (CI=0.28-1.55) which translates to an estimated rate of decline of 8.4% (CI=-55.3-72.0%). This rate and the difference between 2015 and 2016 estimates is not statistically significant.

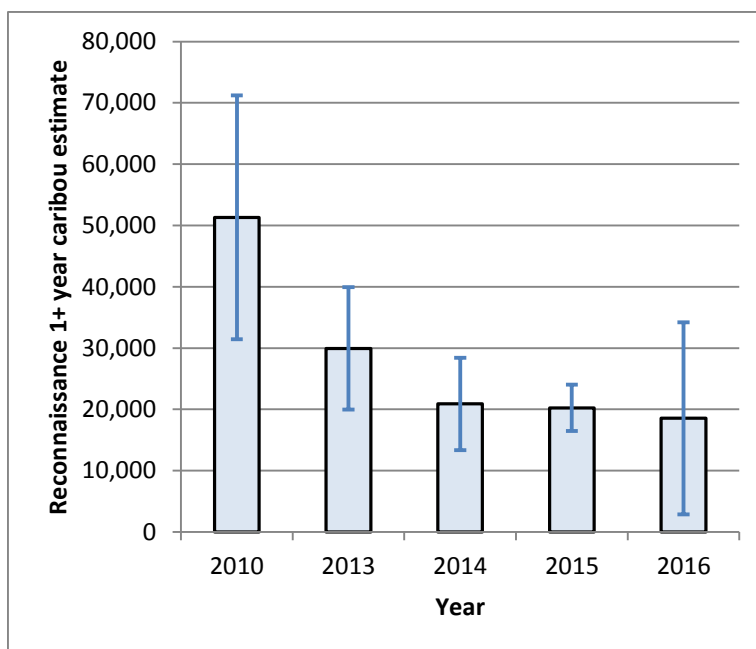


Figure 5: Reconnaissance estimates of caribou on the core calving area for the Bluenose-East herd. The 2016 estimate includes the south stratum in this figure.

Further inference on trend and distribution is revealed by the summary statistics associated with each yearly survey. From this it can be seen that the number of caribou counted, the mean caribou counted per segment, and associated density have all decreased from 2010 to 2016 (Table 2).

Table 2: Summary of caribou observed per segment and segment densities for the Bluenose-East caribou herd from 2010-2016

Year	Segments surveyed	Caribou observed per segment				Segment densities				
		Total counted	Mean	SE	Min	Max	Mean	SE	Min	Max
2010	132	4249	32.19	4.06	0	301	4.02	0.51	0.00	37.63
2013	92	2431	26.42	3.91	0	229	3.30	0.49	0.13	28.63
2014	89	1694	19.03	2.72	0	161	2.38	0.34	0.00	20.13
2015	89	1654	18.58	2.24	0	113	2.32	0.28	0.00	14.13
2016	88	1486	16.89	4.75	0	397	2.11	0.59	0.00	49.63

In addition, the frequency of high density segments (segments with > 10 caribou/km²) has decreased since 2010 as indicated by boxplots of segment densities for each year (Figure 6). In 2016, there were only 2 segments which had higher (> 10 caribou/km²) densities with few moderate density (5-10 caribou per km²) segments compared to previous years indicating lower overall densities and a greater degree of aggregation in 2016 compared to previous years. Figures 7 and 8 in Appendix 1 present the data in Figure 6 as bar charts (as was done in previous analyses).

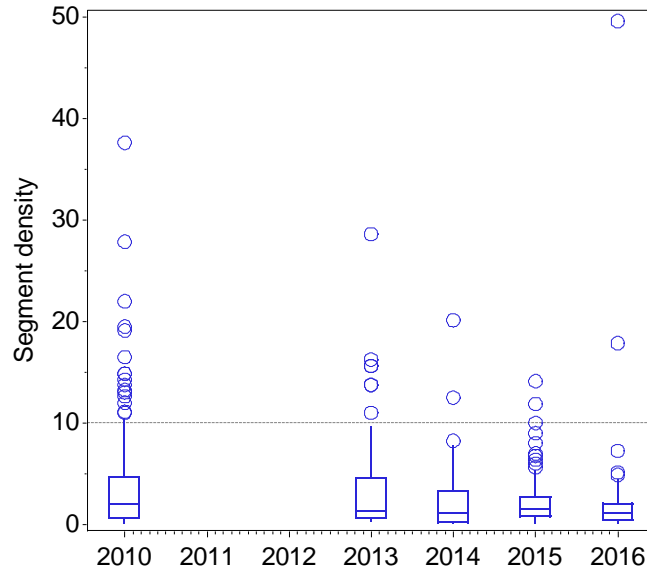


Figure 6: Boxplots of segment densities for Bluenose-East reconnaissance survey strata. The central line is the median density, the box indicates the 25th and 75th percentiles. The line indicates the inter-quartile range (1.5 times the difference between the 25th and 75th percentile). Points beyond the line are outlier points.

Discussion

The results of the 2016 survey suggest a continued decline of the Bluenose-East herd as indicated by lower densities at many of the survey segments (Figure 3) and a slightly lower overall estimate of caribou on the calving ground (Figure 5). Low precision of the 2016 estimate challenges exact determination of trend from 2015 to 2016. The distribution of segment densities (Figure 6) indicates that there were fewer moderate density segments in 2016 with 2 outlier high density segments indicating a higher degree of aggregation of caribou on the core calving ground.

The lower precision of estimates in 2016 was due to the caribou being aggregated in a north-south line which paralleled a single transect. This caused a large difference in transect densities in the high stratum and subsequent lower precision (Figure 5). We speculate that the Bluenose-East might be following the same strategy as the Bathurst herd which is to aggregate into a smaller area as population size declines. It can be seen that densities were much more even in 2015 (Figure 3) and therefore the precision for the 2015 high stratum based on the reconnaissance survey was much better (i.e. CV=9.6% for an overall CV for 2015 survey of 7.9%). The only way to confront aggregation is to stratify the survey such as done in photo survey years and increase coverage (i.e. to 5 km spacing) in reconnaissance years.

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Literature cited

- Adamczewski, J., J. Boulanger, B. Croft, T. Davison, H. Sayine-Crawford, and B. Tracz. 2014. A comparison of calving and post-calving photo-surveys for the Bluenose-East herd of barren-ground caribou in the Northwest Territories, Canada in 2010. Environment and Natural Resources, Government of Northwest Territories.
- Boulanger, J., B. Croft, and J. Adamczewski. 2014. An estimate of breeding females and analyses of demographics for the Bluenose-East herd of barren ground caribou: 2013 calving ground photographic survey. Department of Environment and Natural Resources, Government of Northwest Territories, File Report No. 143.
- Boulanger, J., B. Croft, J. Adamczewski, D. Lee, N. C. Larter, and L. M. Leclerc. 2016. An estimate of breeding females and analyses of demographics for the Bluenose-East herd of barren-ground caribou: 2015 calving ground photographic survey. Environment and Natural Resources, Govt of Northwest Territories.
- Nishi, J. 2010. Appendix M. Potential for systematic surveys of Bathurst caribou calving grounds to contribute to herd monitoring *in* J. Nishi, B. Croft, J. Boulanger, and J. Adamczewski, editors. An estimate of breeding females in the Bathurst herd of barren-ground caribou, ENR File Report No 144. Environment and Natural Resources, Government of Northwest Territories, Yellowknife, NWT, Yellowknife NWT.

Appendix-plots of the distribution of segment densities

Summaries of frequencies of segment categories that have been used previously in reconnaissance analyses and are included for reference.

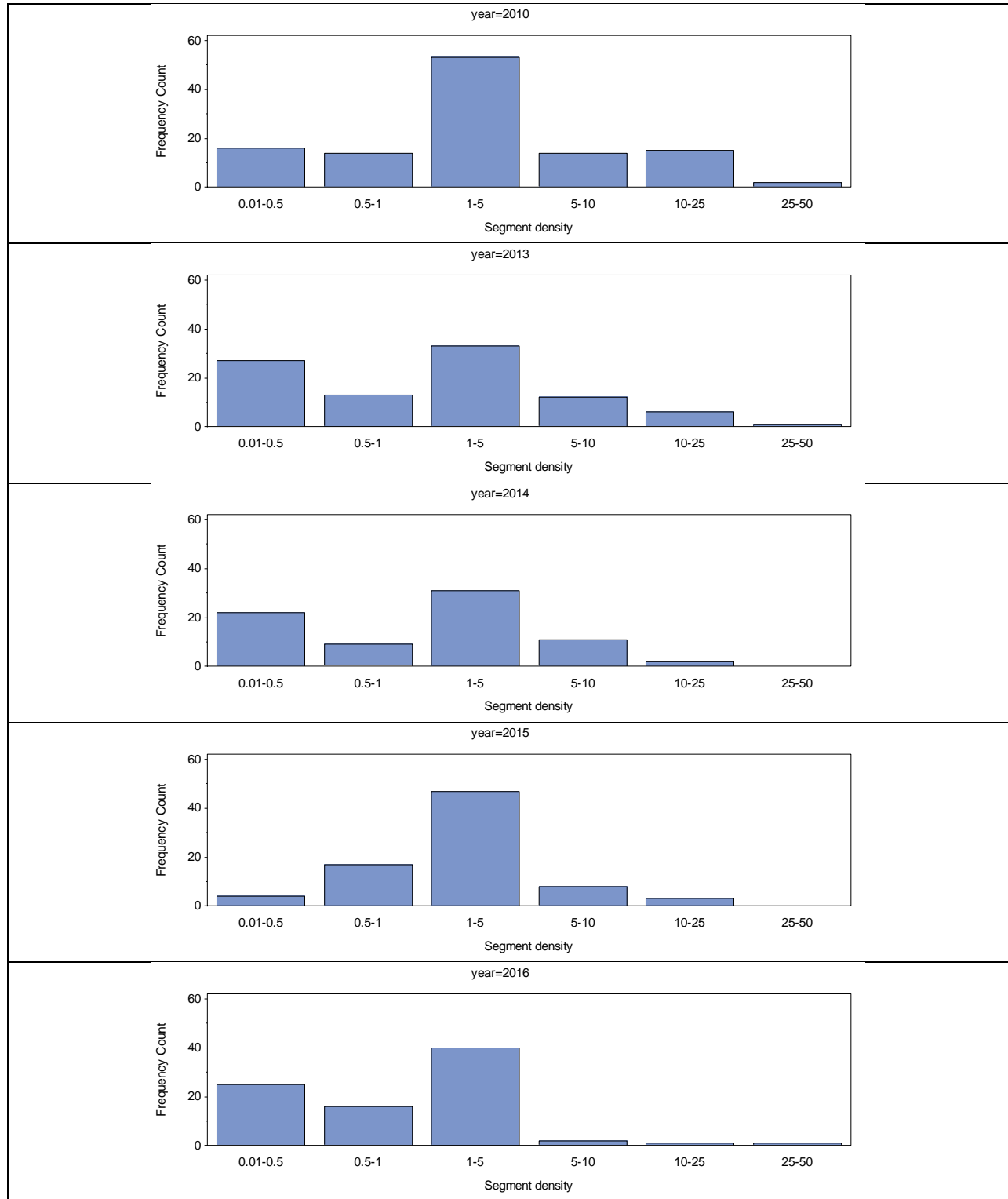


Figure 7: Frequencies of segment counts by year of survey

Another intuitive way to summarize the data is by the actual number of caribou counted per segment density category. This summary reveals a shift to the mid category (1-5) up to 2015 then a split between lower and higher (25-50) categories in 2016 due to aggregation.

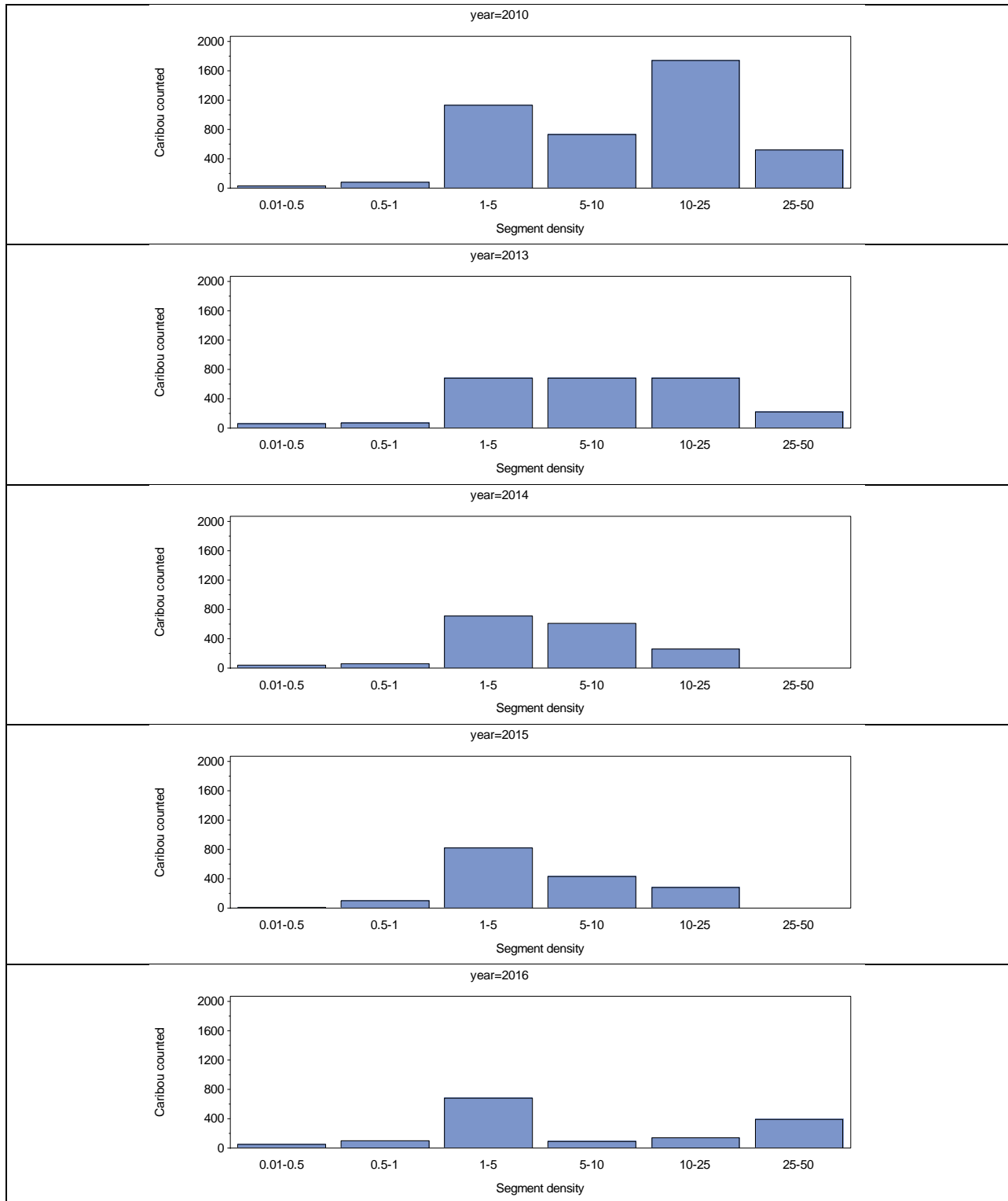


Figure 8: The number of caribou counted per segment density category by survey year.