



Post-2022 Hunting Season Mule Deer Survey: Gardiner Basin

Prepared by: Michael Yarnall, Livingston Area Wildlife Biologist

17 January 2023

Post 2022 Survey

Survey Details

Date: 15 December 2022

Pilot: Neil Cadwell (FWP)

Observers: Michael Yarnall (FWP) Kyle Orozco (FWP)

Aircraft: A-star (helicopter)

Objective: Estimate post-season buck and early winter fawn recruitment ratios. Post-season surveys are primarily used to evaluate the sex and age structure of populations after the hunting season. Total numbers and population trend data are collected more intensively during spring green-up mule deer surveys. The age and sex structure are characterized relative to the number of does. The underlying assumption is that does are the most stable class; therefore, variations in buck:doe and fawn:doe ratios will primarily be influenced by variation in buck and fawn recruitment and survival. This assumption is generally warranted by the relatively high and stable survival rate of adult females; though it should be noted that changes in adult female survival could influence ratios.

Flight Details: We took off from the Gardiner airport at 8:50 and began surveying in the the southwest portion of the trend area, working northerly on the west side of the Yellowstone (Stephen's Creek, Cinnabar Mountain, Mulherin Creek, Sphinx Mountain, etc.). We then crossed the river and began working south from Yankee Jim Canyon (Bassett Creek, Cedar Creek, Slip and Slide Creek, etc.). We continued working south (Little Trail Creek, Travertine, Eagle Creek). Near the vicinity of Jardine, we paused to return to the airport for fuel (12:23 - 12:45) before returning to complete our flight (Deckard Flats and back to the airport). We landed again in Gardiner at 13:30. Total flight time was 7.0 hours (4.6 survey hours and 2.4 hours of pilot ferry).

Survey Conditions: The temperature was 19 F at takeoff and 22 F at the end of our flight. Winds were generally mild: approximately mph at the start and 8-12 mph when we landed. Skies were cloudier than forecasted, and we experienced a low cloud ceiling (slightly above the upper elevations of the trend area) and frequent snow showers at the north end of the trend area near Yankee Jim Canyon. Clouds were higher and fewer at the southern end of the trend area. Overall, we experienced cloudy conditions with light that was flatter than ideal. However snow coverage was excellent, with new snow on top of old snow; this helped to improve sightability. Most deer were up feeding in the open, but we did observe some in the timber.

Survey Results

We observed **611** total mule deer (Figure 1). We classified **359** does, **167** fawns, and **77** bucks. This resulted in **46.5 fawns per 100 does** and **21.4 bucks per 100 does**. Of the 77 bucks observed, 37 (48%) were yearlings, 40 (52%) were 2.5 years or older ("mature bucks"), and of the mature bucks, 19 (25% of all bucks) had at least 4 points on one side.

We also observed **13** golden eagles, **4** bald eagles, **5** coyotes, and **46** bighorn sheep, in addition to numerous elk.

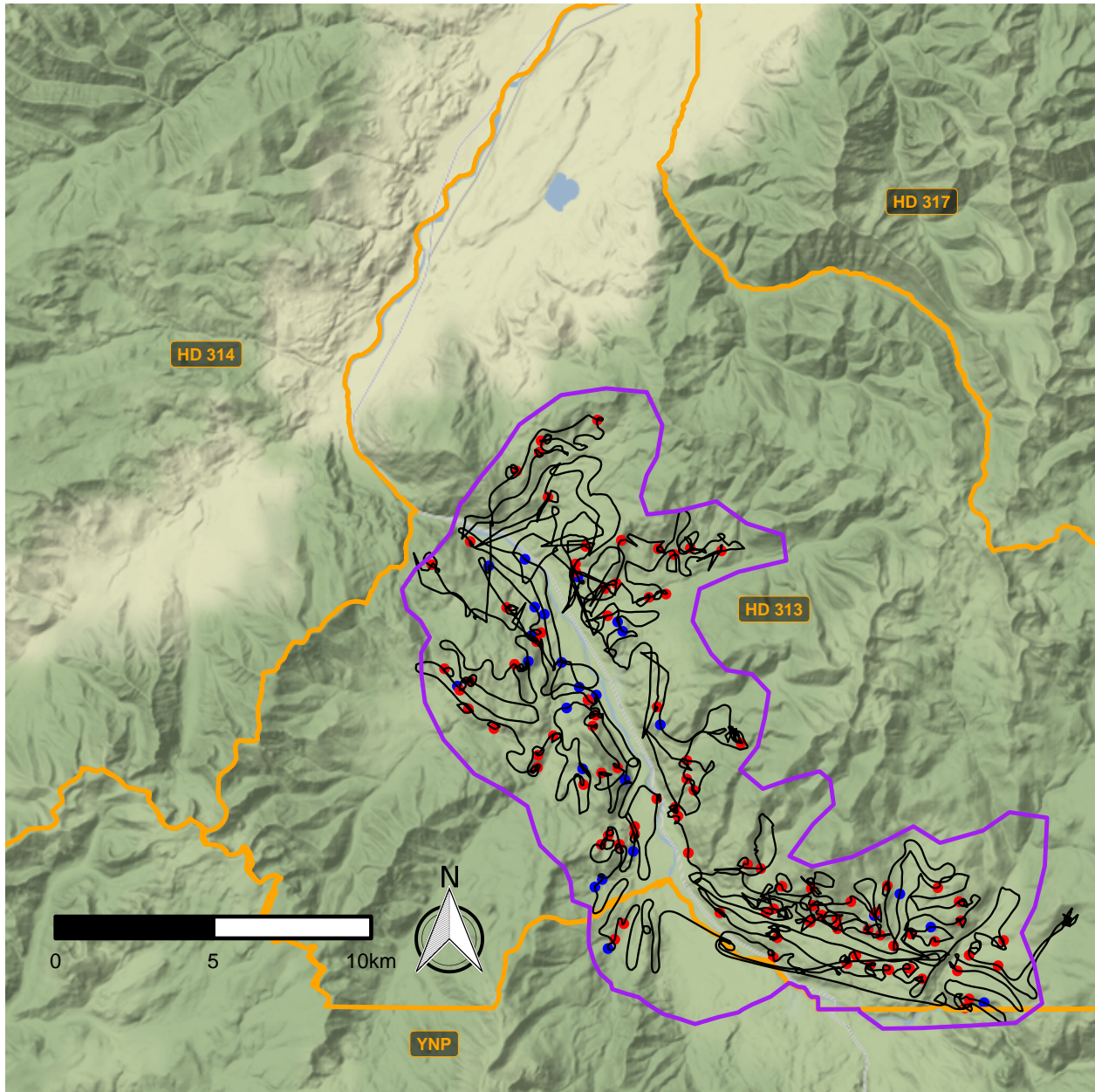


Figure 1: Flight path and locations of mule deer groups (red) and incidental observations of other species (blue) during the post 2022 season survey of the Gardiner Trend Area (outlined in purple).

Population Trends

Early winter fawn:doe ratios are an important indicator of fawn production and pre-winter survival, however fawns are not considered to be recruited into the population until they have survived through the first year. Fawn recruitment and overall population trends are assessed again during the spring green-up survey. This year's observed fawn:doe ratio (**46.5** fawns per 100 does) was lower than observed last survey (Figure 2), representing an 26 percent decrease compared to the ratio observed during the post-2021 season survey. This winter's fawn:doe ratio is 15 percent below the long-term average (**54.5, SE = 2**).

We observed a marked increase in the number of bucks observed per 100 does (Figure 3). This year's buck:doe ratio (**21.4** bucks per 100 does) was 37 percent greater than observed during the post-2021 season survey (28 percent above the long-term average (**16.8, SE = 1.2**)). It is probable that some of this observed increase is due to sampling variation, rather than completely due to an increase in the buck to doe ratio. This year, substantial early snowfall may have moved more bucks into the survey area earlier than in recent winters, which were more mild by comparison.

The number of yearling bucks observed per 100 does (Figure 4) and the proportion of bucks observed that are yearlings (Figure 5) are indicators for future recruitment of mature bucks into the population. We observed a greater number of yearling bucks per 100 does compared to the post-2021 season survey. This ratio had been below the long-term average (**8.2, SE = 0.6**) in recent years, but this year is above the long-term average (Figure 4). The proportion of bucks that were yearlings increased this year (Figure 5). We observed more older bucks (≥ 2.5 years old) per 100 does (Figure 6). Although we observed more older bucks, the proportion of older bucks declined (Figure 7, as we would expect, given the increased numbers of yearling bucks). Both the number of older bucks per 100 does and the proportion of bucks that are ≥ 2.5 years old remain above long-term averages (Figures 6 and 7). The proportion of bucks with ≥ 4 points on one side increased markedly from the previous survey and is above long-term averages (Figure 8).

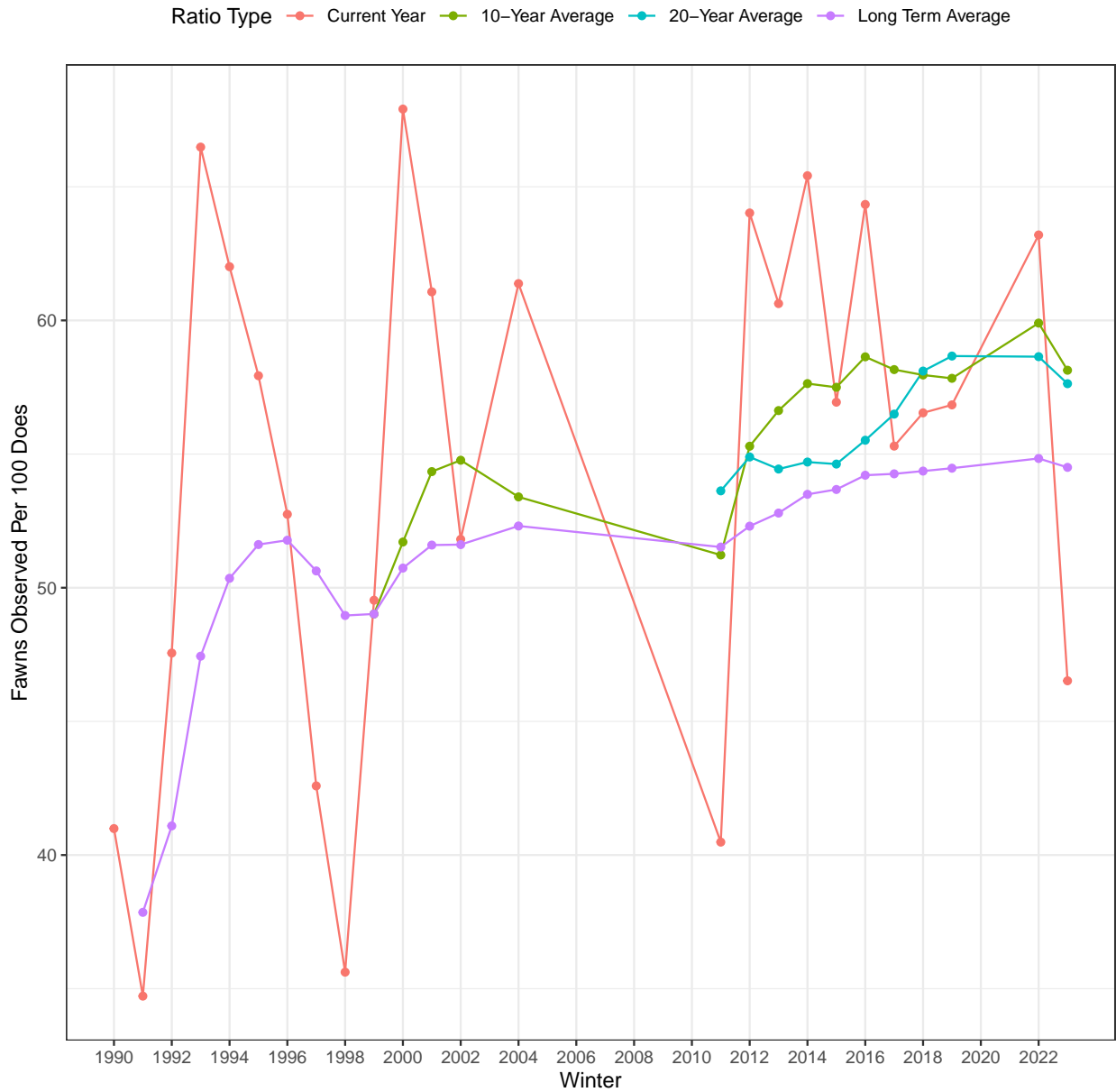


Figure 2: Fawn:Doe ratios observed during post-hunting season surveys of the Gardiner Trend Area located in HD 313, 1990-Present. Labels on X axis correspond to the winter after the hunting season (i.e., 2023 refers to the winter of 2022-2023, the post-2022 hunting season survey). Note that the 10-year and 20-year averages are the average of all surveys spanning 10/20 years up to and including the current year; because surveys are usually conducted every year, this average typically includes about 10/20 surveys, but may include fewer during decades where an annual survey was missed. The long-term average includes all data through the current year.

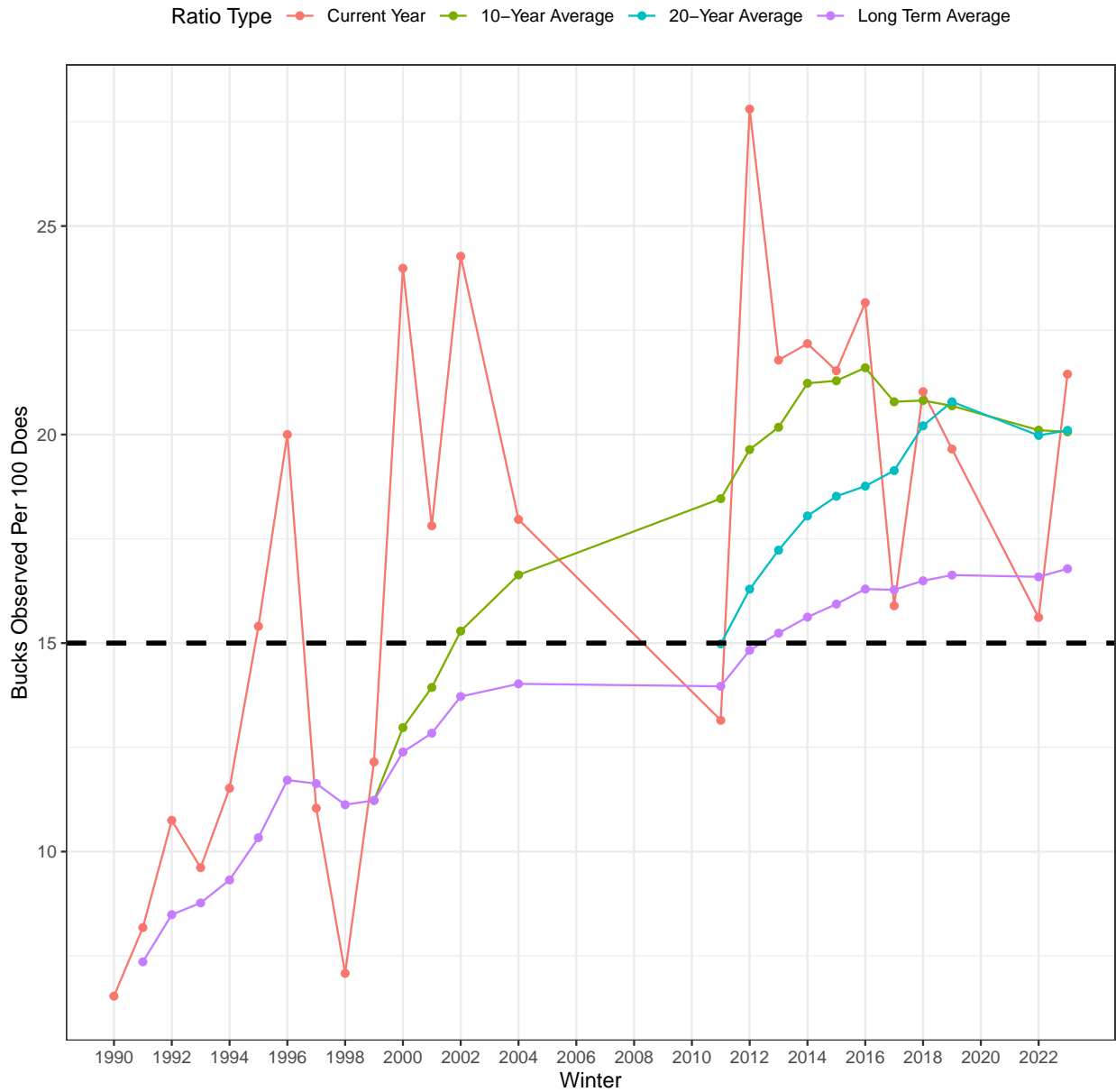


Figure 3: Buck:Doe ratios observed during post-hunting season surveys of the Gardiner Trend Area located in HD 313, 1990-Present. Labels on X axis correspond to the winter after the hunting season (i.e., 2023 refers to the winter of 2022-2023, the post-2022 hunting season survey). The dashed line indicates the minimum goal for post-season buck:doe ratios set when the three week buck season was established in 1994. Note that the 10-year and 20-year averages are the average of all surveys spanning 10/20 years up to and including the current year; because surveys are usually conducted every year, this average typically includes about 10/20 surveys, but may include fewer during decades where an annual survey was missed. The long-term average includes all data through the current year.

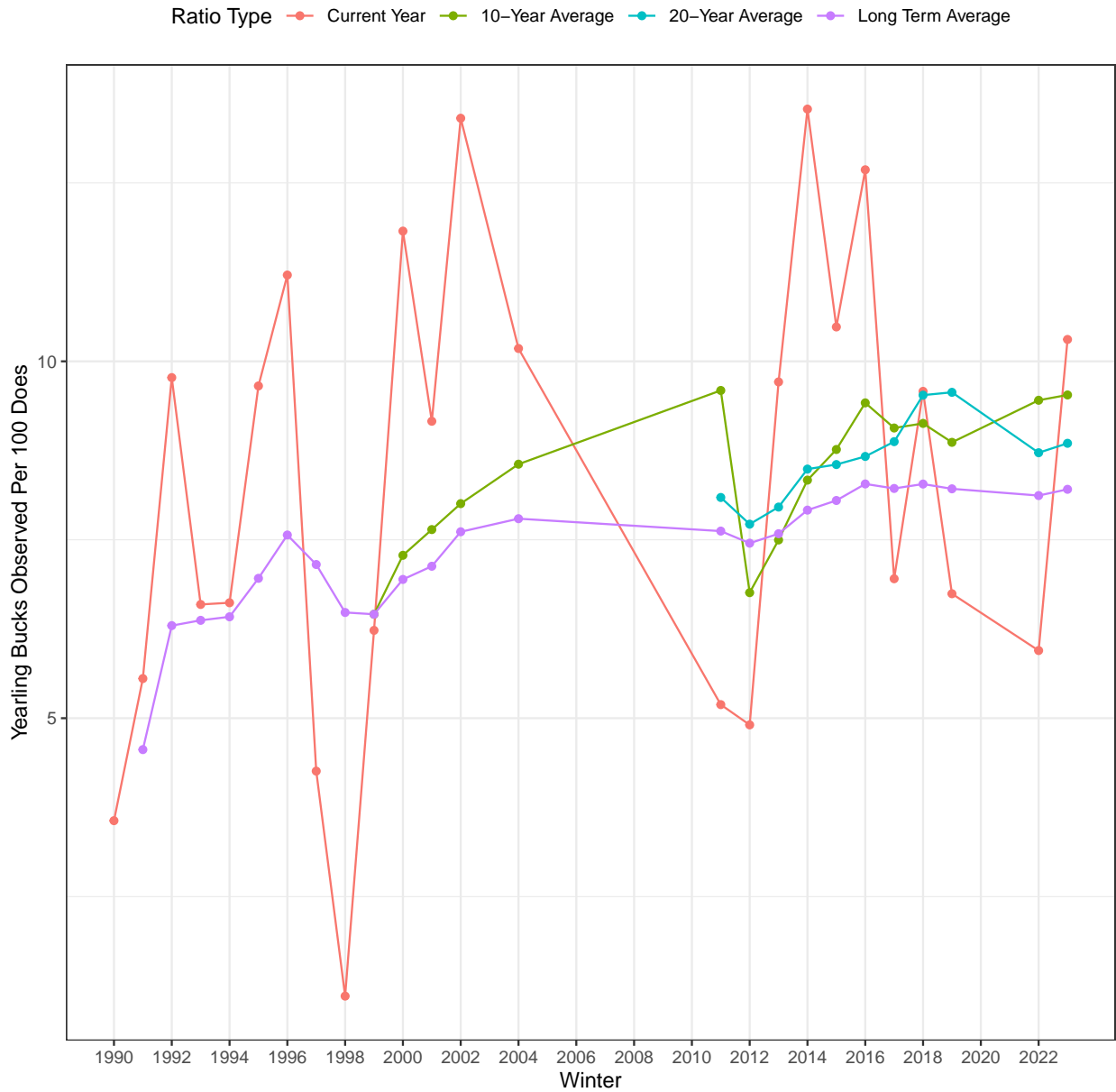


Figure 4: Yearling Buck:Doe ratios observed during post-hunting season surveys of the Gardiner Trend Area located in HD 313, 1990-Present. Labels on X axis correspond to the winter after the hunting season (i.e., 2023 refers to the winter of 2022-2023, the post-2022 hunting season survey). Note that the 10-year and 20-year averages are the average of all surveys spanning 10/20 years up to and including the current year; because surveys are usually conducted every year, this average typically includes about 10/20 surveys, but may include fewer during decades where an annual survey was missed. The long-term average includes all data through the current year.

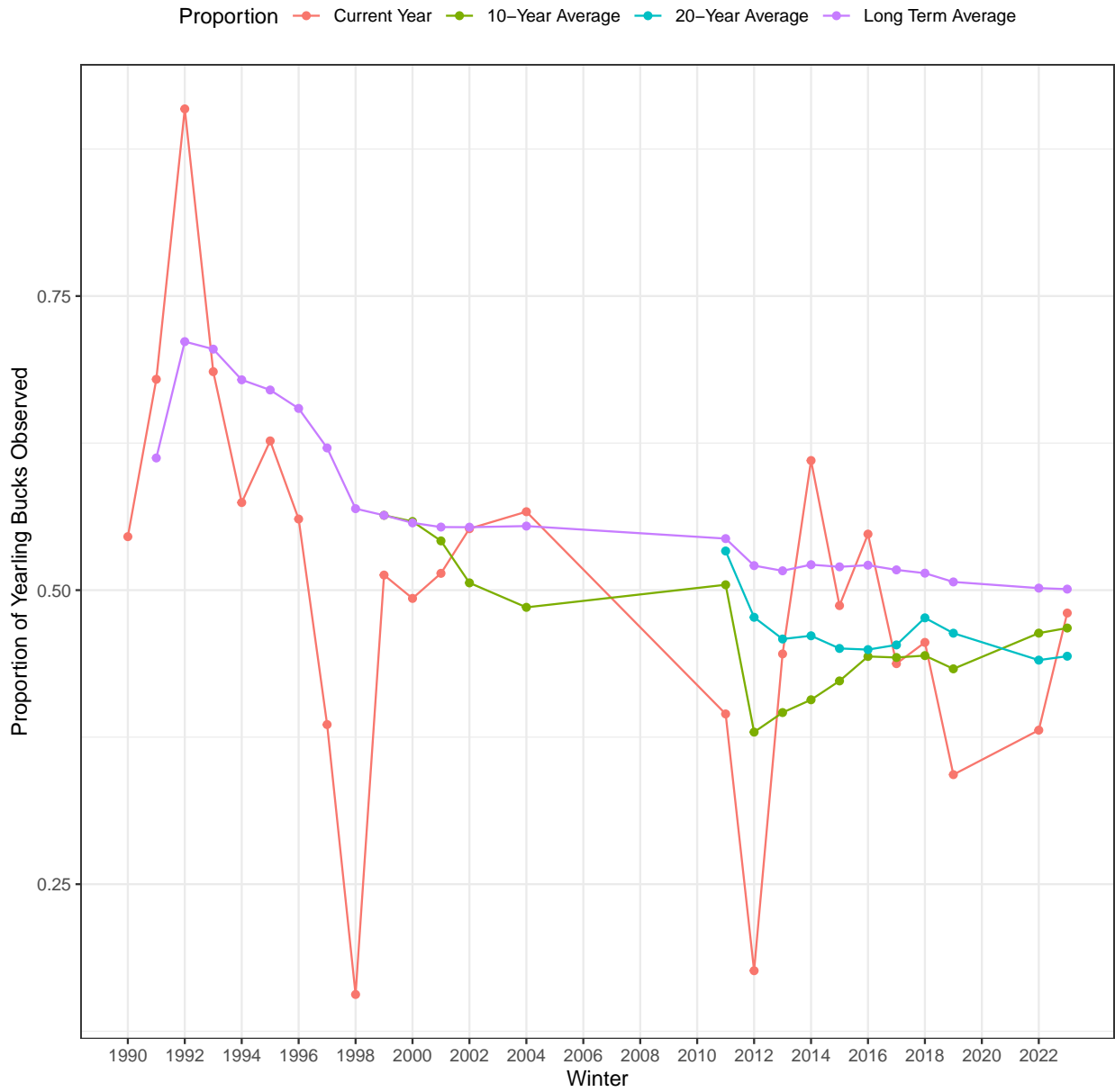


Figure 5: Proportion of bucks observed that were yearling bucks during post-hunting season surveys of the Gardiner Trend Area located in HD 313, 1990-Present. Labels on X axis correspond to the winter after the hunting season (i.e., 2023 refers to the winter of 2022-2023, the post-2022 hunting season survey). Note that the 10-year and 20-year averages are the average of all surveys spanning 10/20 years up to and including the current year; because surveys are usually conducted every year, this average typically includes about 10/20 surveys, but may include fewer during decades where an annual survey was missed. The long-term average includes all data through the current year.

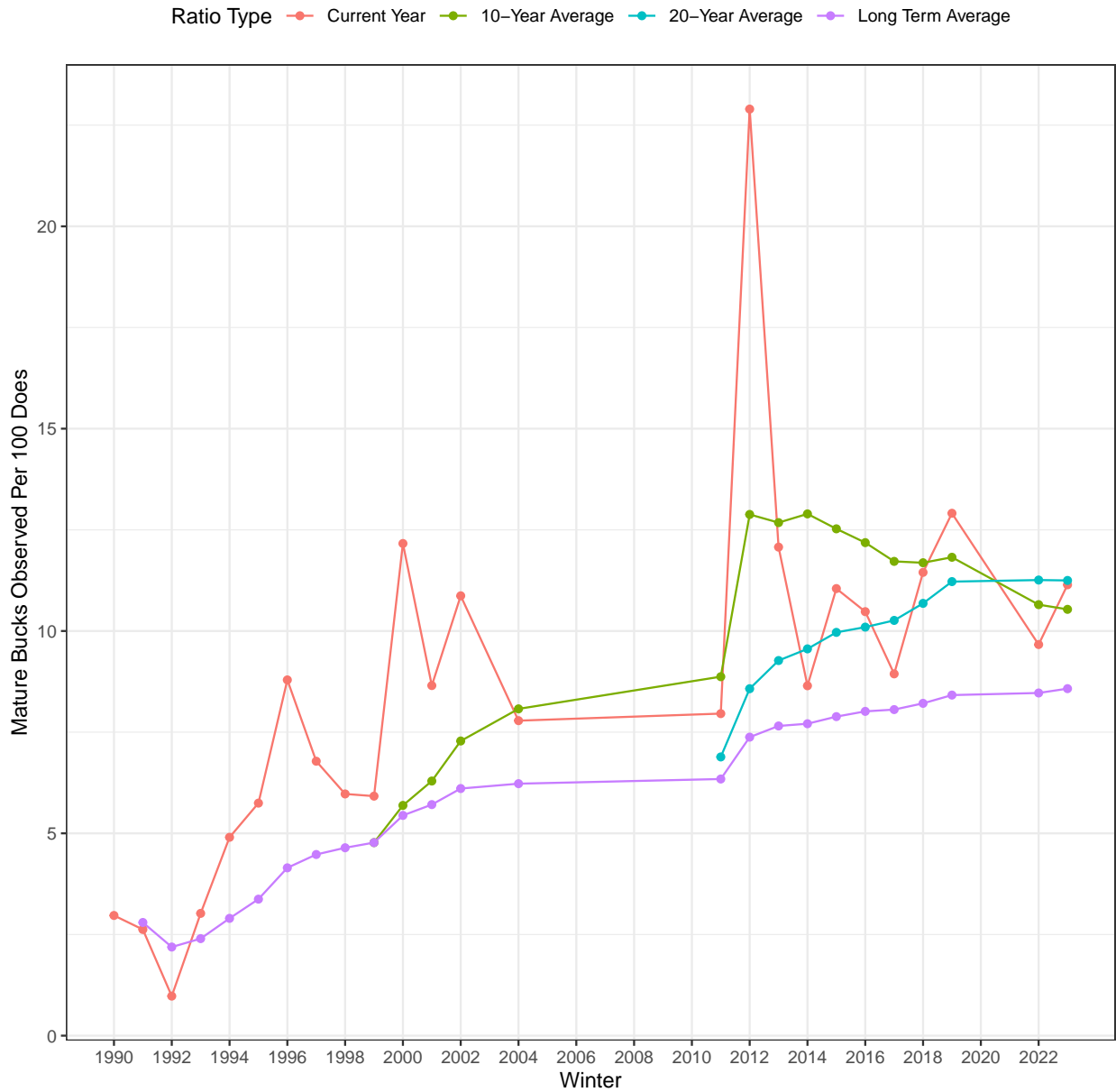


Figure 6: Mature Buck:Doe ratios observed post-hunting season surveys of the Gardiner Trend Area located in HD 313, 1990-Present. Labels on X axis correspond to the winter after the hunting season (i.e., 2023 refers to the winter of 2022-2023, the post-2022 hunting season survey). Note that the 10-year and 20-year averages are the average of all surveys spanning 10/20 years up to and including the current year; because surveys are usually conducted every year, this average typically includes about 10/20 surveys, but may include fewer during decades where an annual survey was missed. The long-term average includes all data through the current year.

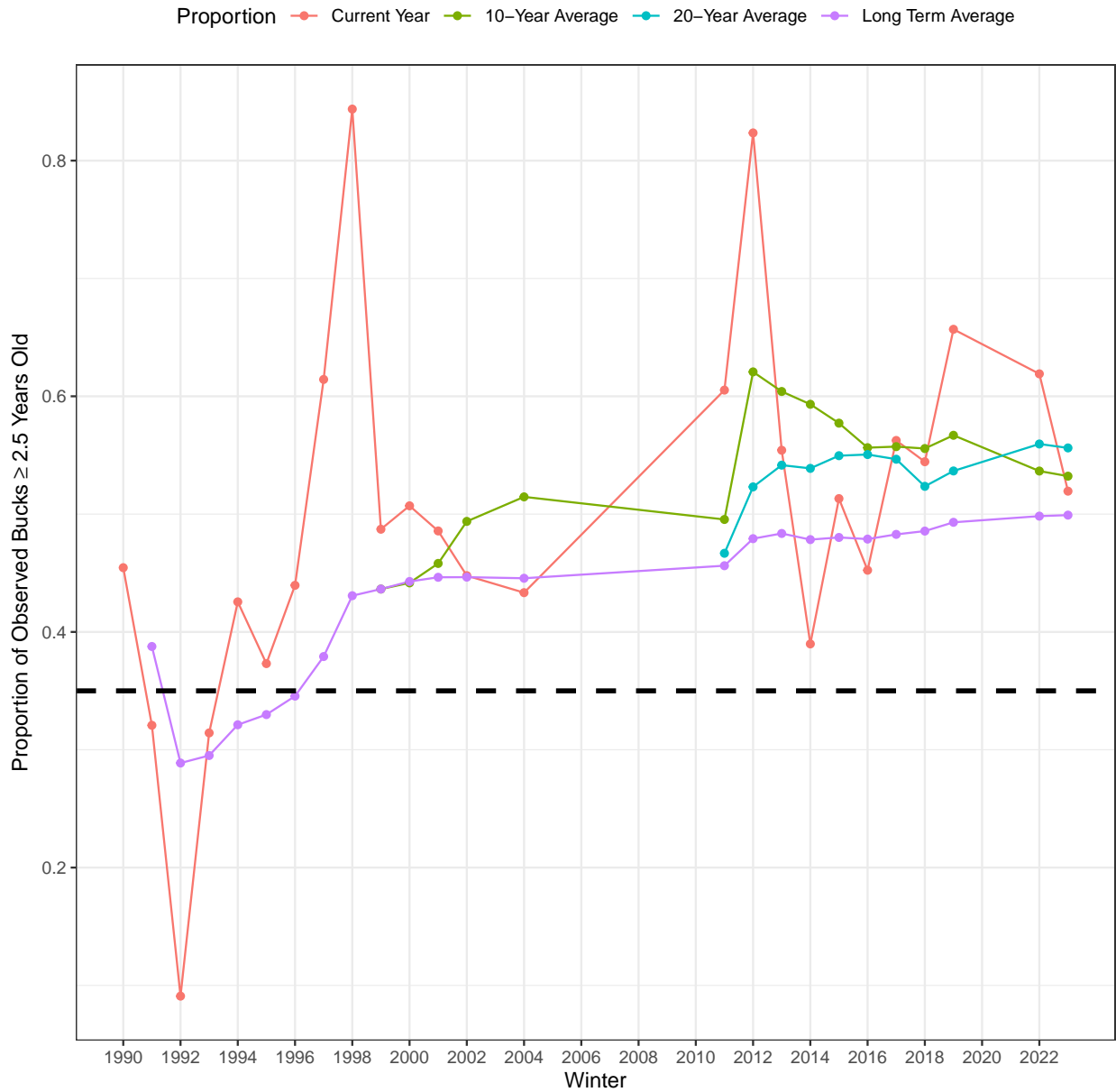


Figure 7: Proportion of bucks observed that were at least 2.5 years old during post-hunting season surveys of the Gardiner Trend Area located in HD 313, 1990-Present. Labels on X axis correspond to the winter after the hunting season (i.e., 2023 refers to the winter of 2022-2023, the post-2022 hunting season survey). The dashed line indicates the minimum goal for the proportion of older-age bucks set when the three week buck season was established in 1994. Note that the 10-year and 20-year averages are the average of all surveys spanning 10/20 years up to and including the current year; because surveys are usually conducted every year, this average typically includes about 10/20 surveys, but may include fewer during decades where an annual survey was missed. The long-term average includes all data through the current year.



Figure 8: Proportion of bucks observed that had at least 4 antler points on one side during post-hunting season surveys of the Gardiner Trend Area located in HD 313, 1990-Present. Labels on X axis correspond to the winter after the hunting season (i.e., 2023 refers to the winter of 2022-2023, the post-2022 hunting season survey). Note that the 10-year and 20-year averages are the average of all surveys spanning 10/20 years up to and including the current year; because surveys are usually conducted every year, this average typically includes about 10/20 surveys, but may include fewer during decades where an annual survey was missed. The long-term average includes all data through the current year.

Harvest and Management History

HD 313 is a mule deer special management district. Mule deer wintering in the Gardiner Basin are primarily migratory, some traveling long distances from many different summer ranges. Once deer arrive on winter range in the Gardiner Basin they are highly vulnerable to harvest due to the open terrain, large amounts of public land, and road systems that facilitate hunter access in areas of high mule deer use. A special management season has been in place since 1994 which allows a three week buck season and no buck harvest opportunity during the final two weeks of the general season. These changes were made in fall 1994 following three years of a “2-Point Mule Deer Season” during 1991-1993 which did not achieve objectives. These changes were made with the objectives of improving quantity and quality of bucks, specifically to:

- Maintain a post season ratio of at least 15 bucks:100 does (previously 4-6 bucks/100 does)
- Increase the percentage of older bucks (≥ 2.5 years) in the post season population to 35% or more (previously 25-29%).

This year’s observed buck:doe ratio is above the minimum goal (Figure 3). The objectives of the 3-week buck season have been met most years since it was established (Figures 3 and 7) Antlerless harvest has been permitted with antlerless B licenses in varying numbers over the years (Table 1).

Total harvest has trended down in recent years (Figure 9, 2022 harvest estimates are not yet available); this decline has been driven by a decline in buck harvest, as antlerless harvest has been relatively stable (Figure 10) since 2018. Although buck harvest has trended down in recent years, the proportion of larger bucks harvested (≥ 4 antler points on one side) has remained relatively stable (Figure 11, Table 1).

Due to spring survey results indicating declining mule deer numbers and declining harvest (Figure 9), antlerless opportunity was reduced for the 2012-2013 seasons. Mule deer antlerless licenses were largely eliminated statewide for the 2014-2015 seasons due to concerns over statewide mule deer numbers. As the number of mule deer observed in the Gardiner Basin increased, antlerless B licenses were reinstated with a limited quota of 50 in 2016. This quota was increased to 100 in 2018.

When the population is within 30% of the long-term average, Montana’s Adaptive Harvest Management plan for mule deer recommends none-moderate numbers of antlerless B licenses. When the population is substantially below the long term-average, the AHM plan recommends limiting antlerless harvest to B licenses issued to respond to localized game damage situations. Total numbers and population trend will be assessed again during the spring green-up survey for the Gardiner trend area.

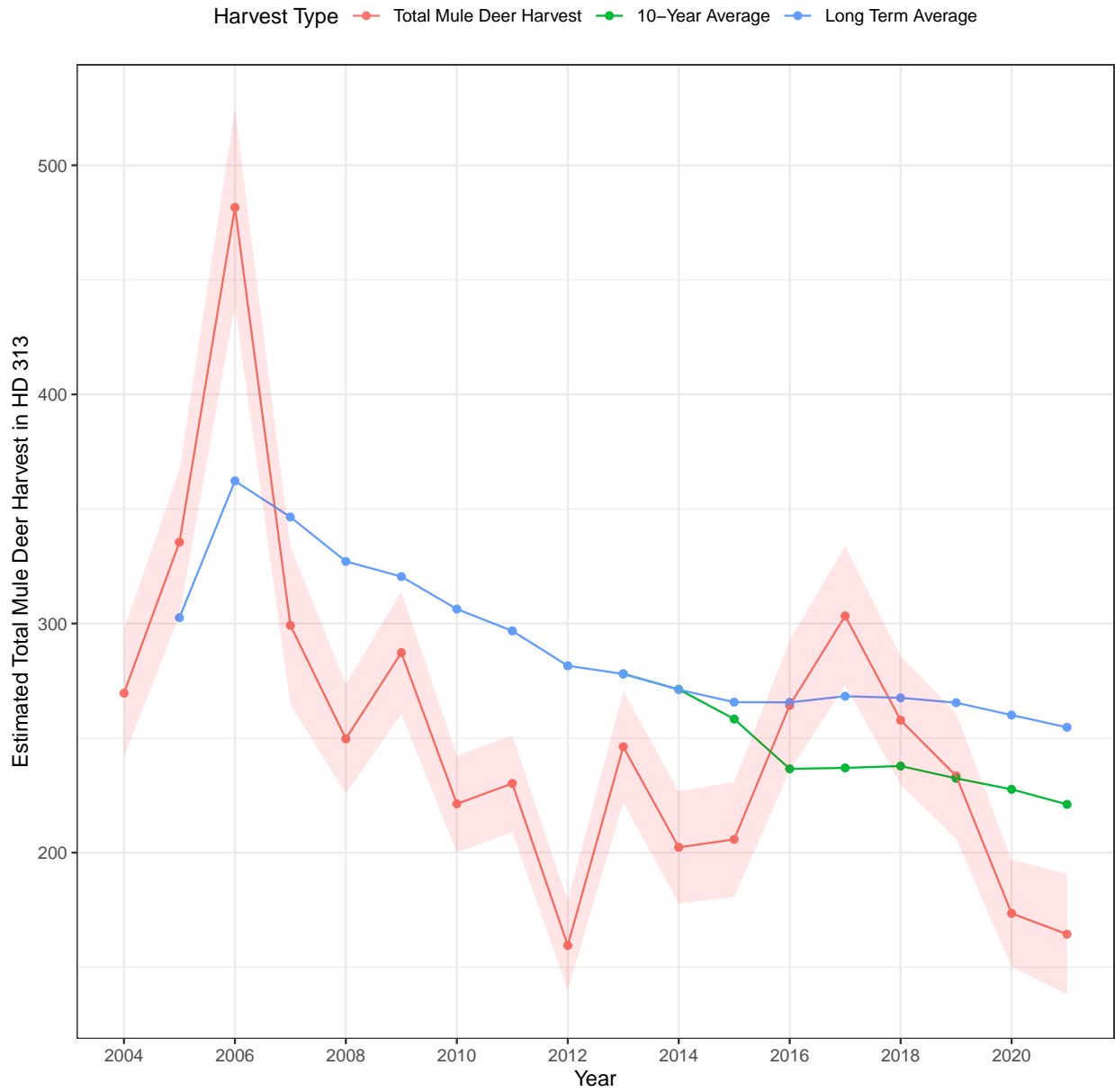


Figure 9: Estimated total mule deer harvest in HD 313, 2004-Present. The shaded red ribbon represents the 80 percent confidence interval for each annual total harvest estimate. Note that the 10-year average is the average of all surveys spanning 10 years up to and including the current year. The long-term average includes all data through the current year (i.e. the sample size increases in later years).

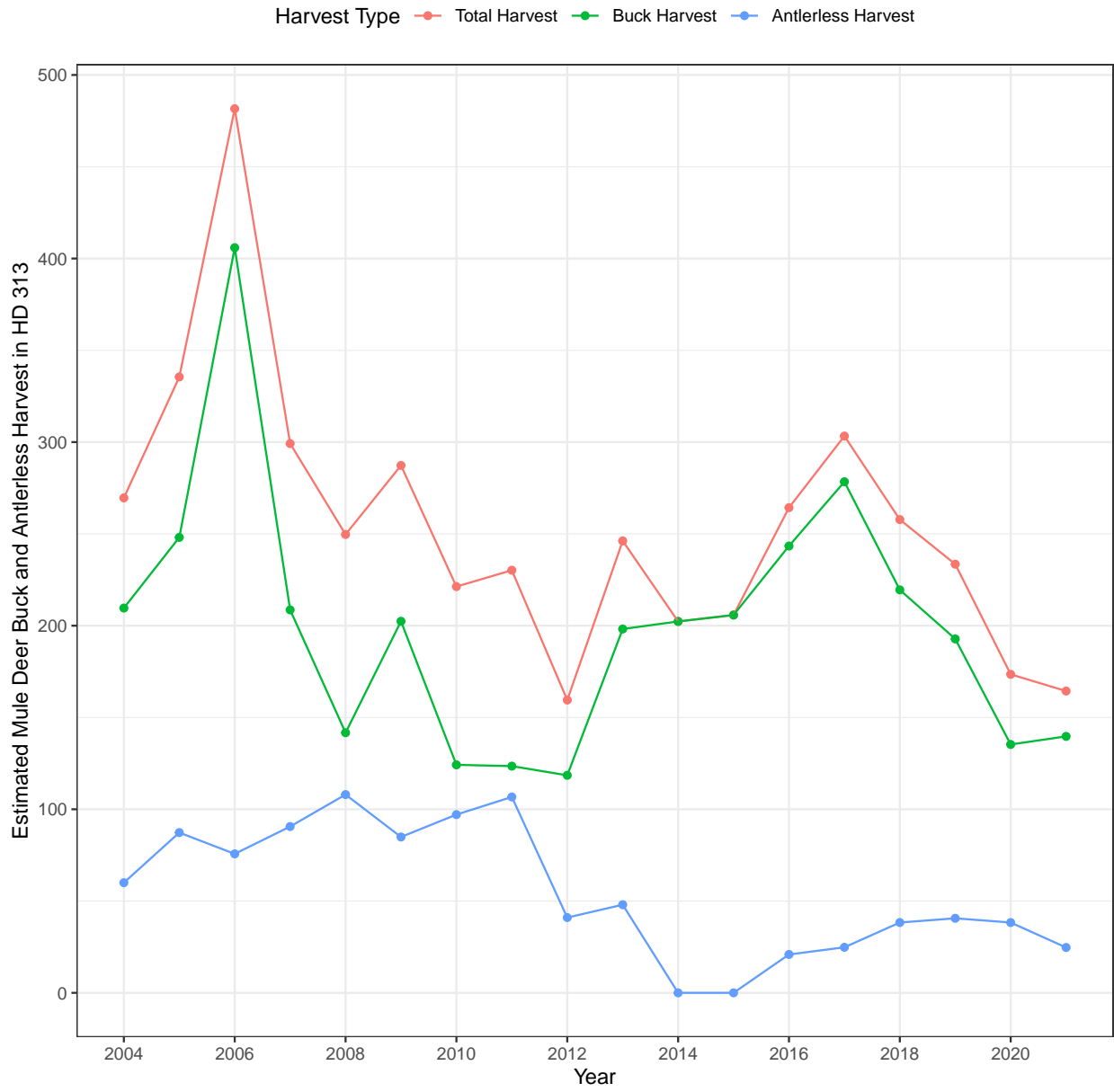


Figure 10: Estimated total, buck, and antlerless mule deer harvest in HD 313, 2004-Present.



Figure 11: Estimated mule deer buck harvest in HD 315, 2004-Present.

Table 1: Estimated harvest mule deer in HD 313, 2004-2021 (2022 harvest estimates are not yet available).

License Year	Total Harvest ^a	Antlerless Harvest	B License Quota ^b	Buck Harvest	Proportion Bucks \geq 4 Points ^c
2004	270	60	175	210	0.438
2005	336	87	175	248	0.598
2006	482	76	175	406	0.589
2007	299	91	175	209	0.608
2008	250	108	325	142	0.668
2009	287	85	325	202	0.640
2010	221	97	325	124	0.537
2011	230	107	325	124	0.605
2012	160	41	85	118	0.671
2013	246	48	85	198	0.636
2014	202	0	0	202	0.706
2015	206	0	0	206	0.611
2016	264	21	50	243	0.601
2017	303	25	50	278	0.587
2018	258	38	100	220	0.631
2019	234	41	100	193	0.554
2020	174	38	100	135	0.581
2021	164	25	100	140	0.645

^a Rounding error may result in an estimated total that is different than the sum of the buck and antlerless harvest.

^b Prior to 2014, B licenses in HD 313 were issued for 3 separate subunits; this column represents the total issued in all 3 subunits.

^c The proportion of bucks harvested that had at least 4 antler points on one side.