2025 Northern Yellowstone Elk Classification Survey

Prepared by: Michael Yarnall, Livingston Area Wildlife Biologist

2025 Survey

Survey Details

Date: 5-6 Apr 2025
Pilot: Neil Cadwell (FWP)
Observer: Michael Yarnall (FWP), Kaitlin Macdonald (FWP/MSU)
Aircraft: A-Star (helicopter)
Objective: Count and classify elk within the Northern Yellowstone Elk Herd to obtain an index of the overall sex and age structure of the population.
Flight Details: Some years the northern Yellowstone classification count has been flown as a sampling of winter range areas to obtain a representative sample, but in other years it has been flown intensively, with the goal of obtaining a complete coverage survey. In 2016, 2019, and each year since 2021, the survey has been flown as a complete coverage survey. We flew the flew the Montana portion of this survey (HD 313) and a portion of YNP on 5 April, taking off at 7:07 from the Gardiner Airport, first searching for bulls near the timber in the vicinity of Red Mountain, before surveying cow/calf groups near Dailey Lake and then working south on the east side of the Yellowstone River. Near the vicinity of Bassett Creek we crossed the Yellowstone River and flew the areas between Cinnabar and Sphinx Mountains including Cinnabar Basin, before returning to the east side of the River and working south. We returned to the airport from the Travertine area to refuel (11:00-11:27). We continued working south along the east side of the Yellowstone; after finishing in the vicinity of Deckard Flats we crossed the river and flew the remaining portion north of Beattie Gulch and worked south towards Mammoth. We finished the day by flying the area between the Gardner River, Yellowstone River, and Mount Everts, landing for the day at 13:54. On 6 April, we flew the remaining Yellowstone National Park (YNP) portion of the winter range, taking off at 7:07 to fly upper elevation winter range in YNP. We returned for fuel from the vicinity of Cottonwood Creek (10:45-11:10). From the airport, we flew to the Blacktail Deer Plateau and worked back toward the Yellowstone River, and then worked out towards Crevice Creek and Deckard Flats. We landed for the day at 12:50. Total flight time for this survey was 16.4 hours, including 4.4 hours of pilot ferry time.
Survey Conditions: We had clear skies and full sun both days. Due to the later than normal survey date, snow conditions were less than optimal. Most lower elevation winter range was primarily bare ground, with older, crusty snow at higher elevations. Winds were light both days (generally less than 10 mph throughout). On the first day temperatures ranged from 21F to 46F and on the second day temperatures ranged from 26F to 42F.

Survey Results

This winter's weather conditions resulted in some unusual elk distributions. Although winter conditions were slow to arrive, a cold and snowy period in mid January-mid February served to concentrate animals on

lower elevation winter range. Some areas that are normally known to be traditional wintering areas for bulls in most winters had very few elk. We observed **7226** total elk in **166** groups (Figure 1). We classified **3706** cows, **660** calves, **262** spikes (yearling bulls), and **403** brow-tined bulls. When groups were too large or elk movements during flight interfered with counting and classifying from the air, digital photos were taken to obtain a total count and (when image quality was sufficient) classify animals. Due to lower quality images and elk that were in difficult to classify areas (e.g. timber or near houses) we were unable to classify some animals, resulting in some unclassified antlerless animals (**131**) and unclassified animals (**2064**). Although these animals were not able to be fully classified; the unclassified groups were primarily cow/calf groups in the Montana (HD 313) portion of the survey (Table 1).

Because the unclassified animals are primarily cows/calves and because bull groups are rarely unclassified (due to their smaller group size and visible antlers), calculating bull:cow ratios based solely on the animals that were classified would bias the bull:cow ratios high (due to the under representation of cows). In order obtain bull:cow ratios more representative of the population trend, we grouped elk by elevation sector (Figure 1), and within each elevation sector where there was substantial classification uncertainty, made the following assumptions:

- The ratio of classified cows or calves to the sum of classified cows and calves was representative of the ratio of cows or calves to cows and calves contained within unclassified antlerless animals.
- The ratio of cows or calves to the sum of all classified animals was representative of the ratio of cows or calves to all unclassified animals.

These assumptions are reasonable because we grouped elk by elevation sector (we know that the age/sex classification differs by sector) and because the sample of classified animals within each elevation sector is large relative to the sample of unclassified animals. These assumptions allowed us to estimate the additional number of animals in each age/sex class that were contained within the unclassified animals, which were then used to calculate bull:cow ratios (Table 2). In addition to estimating bull:cow ratios, we further classified bull elk as spikes, bulls with ≤ 5 points, bulls with ≥ 6 points, and shed bulls within each elevation area (Table 3).

We also observed **2** bald eagles, **15** golden eagles, **157** bighorn sheep (though we did not attempt to count/classify a large group of ewes/lambs near Old Yellowstone Trail at Corwin Springs as they had been counted from the ground in the days immediately prior to the survey), **11** coyotes, **1** osprey, **4** moose, and **9** wolves in addition to many mule deer, bison, and pronghorn.

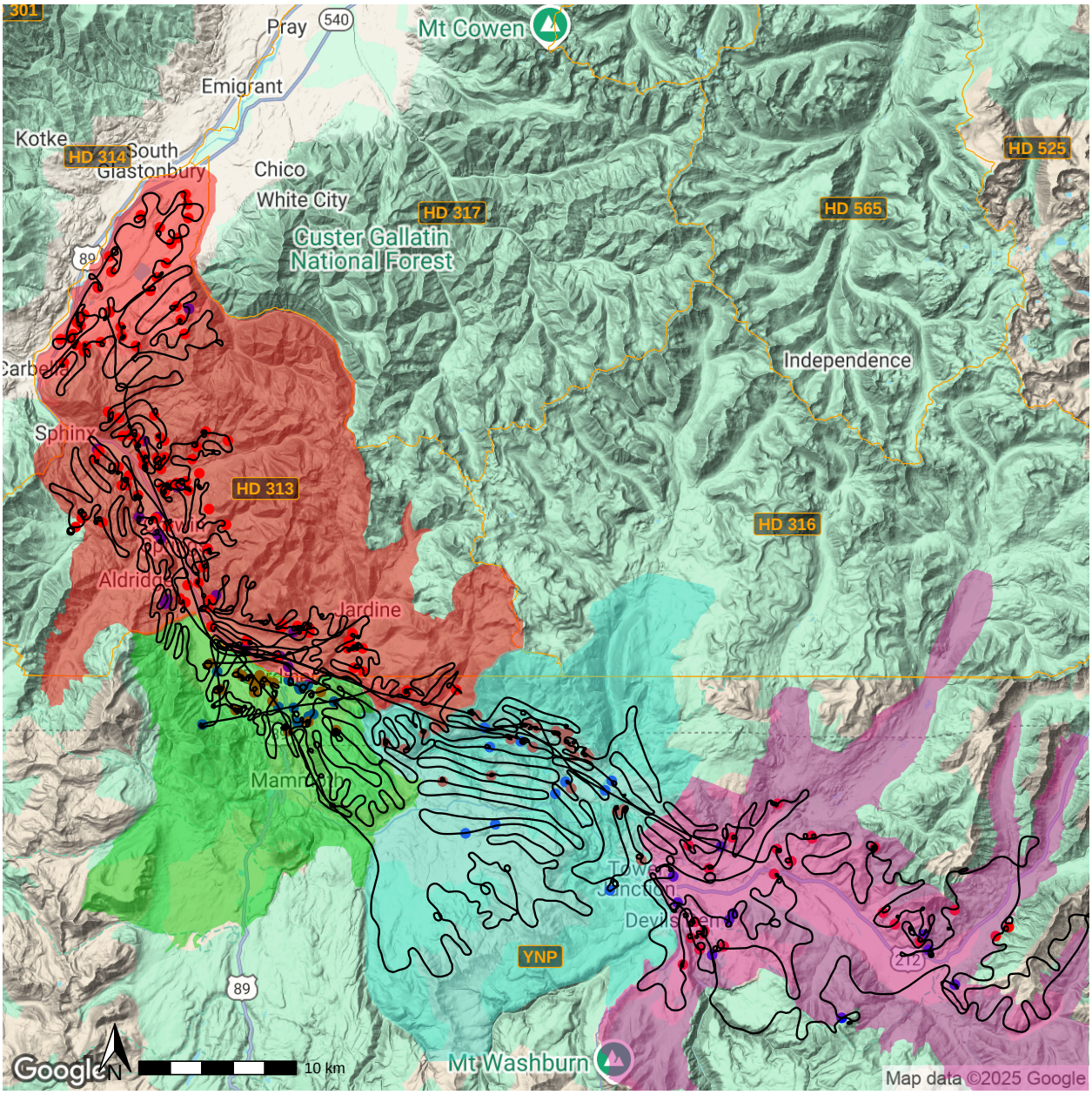

Figure 1: Flight path and locations of elk groups (red) and incidental observations of other species (blue) during the 2025 classification survey of the northern Yellowstone winter range. Shaded polygons indicate the elevation sectors used to group elk locations: low elevation outside YNP (HD 313, light red shading), low elevation inside YNP (light green shading), middle elevations (turquoise shading), and upper elevations (light purple shading).

Table 1: Elk distribution and classifications observed during the 2025 classification survey of the Northern Yellowstone Elk Herd.

Area	Cows	Calves	Unclassified Antlerless	Spikes	Brow-tined Bulls	Total Bulls	Unclassified Elk	Total Elk
Montana - HD 313	**3153**	**579**	**131**	**212**	**93**	**305**	**1956**	**6124**
YNP - Lower	460	65	0	26	62	88	103	716
YNP - Middle	91	15	0	20	138	158	5	269
YNP - Upper	2	1	0	4	110	114	0	117
YNP Total	**553**	**81**	**0**	**50**	**310**	**360**	**108**	**1102**
Northern Range Total	**3706**	**660**	**131**	**262**	**403**	**665**	**2064**	**7226**

Table 2: Estimated elk classification ratios observed during the 2025 classification survey of the Northern Yellowstone Elk Herd. See text for a description of the assumptions used to calculate bull:cow ratios.

Area	Calves: 100 Cows	Spikes: 100 Cows	Brow-tined Bulls: 100 Cows	Total Bulls: 100 Cows
Montana - HD 313	**18.4**	**6.6**	**2.9**	**9.5**
YNP - Lower	14.2	5.6	13.4	19.2
YNP - Middle	16.1	21.5	151.6	173.1
YNP - Upper				
YNP Total	**14.6**	**8.5**	**51.1**	**59.8**
Northern Range Total	**17.9**	**6.8**	**8.5**	**15.3**

Table 3: Bull classification results observed during the 2025 classification survey of the Northern Yellowstone Elk Herd.

Area	**Spikes**	**Bulls ≤ 5 Points**	**Bulls ≥ 6 Points**	**Total Brow-tined Bulls**	**Shed Bulls**	**Total Bulls**	**Proportion Spikes[a]**	**Proportion ≤ 5 Points[b]**	**Proportion ≥ 6 Points[c]**	**Proportion Shed Bulls[d]**
Montana - HD 313	**212**	**46**	**33**	**93**	**14**	**305**	**0.695**	**0.495**	**0.355**	**0.151**
YNP - Lower	26	28	20	62	14	88	0.295	0.452	0.323	0.226
YNP - Middle	20	57	32	138	49	158	0.127	0.413	0.232	0.355
YNP - Upper	4	41	24	110	45	114	0.035	0.373	0.218	0.409
YNP Total	**50**	**126**	**76**	**310**	**108**	**360**	**0.139**	**0.406**	**0.245**	**0.348**
Northern Range Total	**262**	**172**	**109**	**403**	**122**	**665**	**0.394**	**0.427**	**0.270**	**0.303**

[a] Proportion of all bulls that were spikes.

[b] Proportion of brow-tined bulls that had no more than 5 points on each side.

[c] Proportion of brow-tined bulls that had at least 6 points on one side.

[d] Proportion of brow-tined bulls that had already shed their antlers (shed bulls were assumed to have been brow-tined prior to antler drop).

Population Trends

The total number of elk observed during this year's classification count (**7226**) was greater than observed in 2024 (a 24.5 percent increase from the 5597 elk observed during the 2024 classification flight). Typically, a cooperative trend count using multiple fixed-wing aircraft has been conducted each year to estimate overall elk numbers in early winter, but logistical challenges prevented this during the 2024-2025 winter. The total count obtained during the classification flight is not directly comparable to previous trend counts because (all other conditions being equal) detection probability is greater from a helicopter than from fixed-wing aircraft. Despite this caveat, this is the largest number of elk counted on the northern Yellowstone range since 2018 (when 7579 elk were observed during the cooperative fixed-wing survey). The increased number of total elk this year compared to the 2024 classification flight is likely due to a combination of factors, including:

- Mild winter conditions last year, which likely resulted in good overwinter survival last winter.
- This winter started out very mild, with harsh conditions generally not arriving until at least mid January. A particularly cold and snowy period from approximatedly mid January through mid February served to concentrate elk on the winter range. However, conditions warmed in mid February and much of the accumulated snow melted rapidly. So harsh winter conditions served to concentrate elk (and increase their observablity during the survey), but the cold period was of relatively short duration and unlikely to result in a substantial reduction in overwinter survival.

Calf:cow ratios in both the MT and YNP portions (Table 2) of the survey area decreased marginally from 2024 levels, and are near the 10-year averages (Figure 2; Long-time averages are 23.9 (SE = 2.2) for MT and 19.9 (SE = 1.3)) for the entire Northern Range. At the level of recruitment observed during this year's survey (Table 2, Figure 2), it is expected that the population will remain relatively stable in the near future.

The number of spikes observed per 100 cows (Table 2, Figure 3) and the proportion of bulls observed that are spikes (Table 3, Figure 4) are important indicators for future recruitment of mature bulls to the population. This year we observed a moderate increase in the number of spikes per 100 cows (Figure 3) to the previous year. This is another indicator that survival during the winter of 2023-2024 was good.

In the Montana portion of the northern range, the proportion of bulls with ≤ 5 points and the proportion of bulls with ≥ 6 points increased (Figure 5). In both Montana and across the entire northern range, the number of shed bulls was substantially increased this year. This was expected, given the lateness of the survey this year. We observed both 5 and 6 point bulls actively shedding their antlers during our survey. Due to the lateness of this year's survey (and resultant increase in the proportion of shed bulls), any attempt to interpret changes in the relative proportions of brow-tined bulls should be done with substantial caution.

Brow-tined bull ratios remain low north of YNP and similar to recent years (Figures 6 and 7), where the number of both brow-tined and total bulls per 100 cows observed are near the 10-year averages, but remain below the long-term averages (Long-term averages for total bulls per 100 cows are 16.4 (SE = 3.4) and 9.1 (SE = 2.9) for brow-tined bulls per 100 cows). For the entire northern range, the ratios of total bulls and brow-tined bulls observed per 100 cows remain below the long term average, and similar to the 10-year average (Figures 6 and 7; Long-term averages are 25 (SE = 2.9) for total bulls per 100 cows and 18.7 (SE = 2.8) for brow-tined bulls per 100 cows.

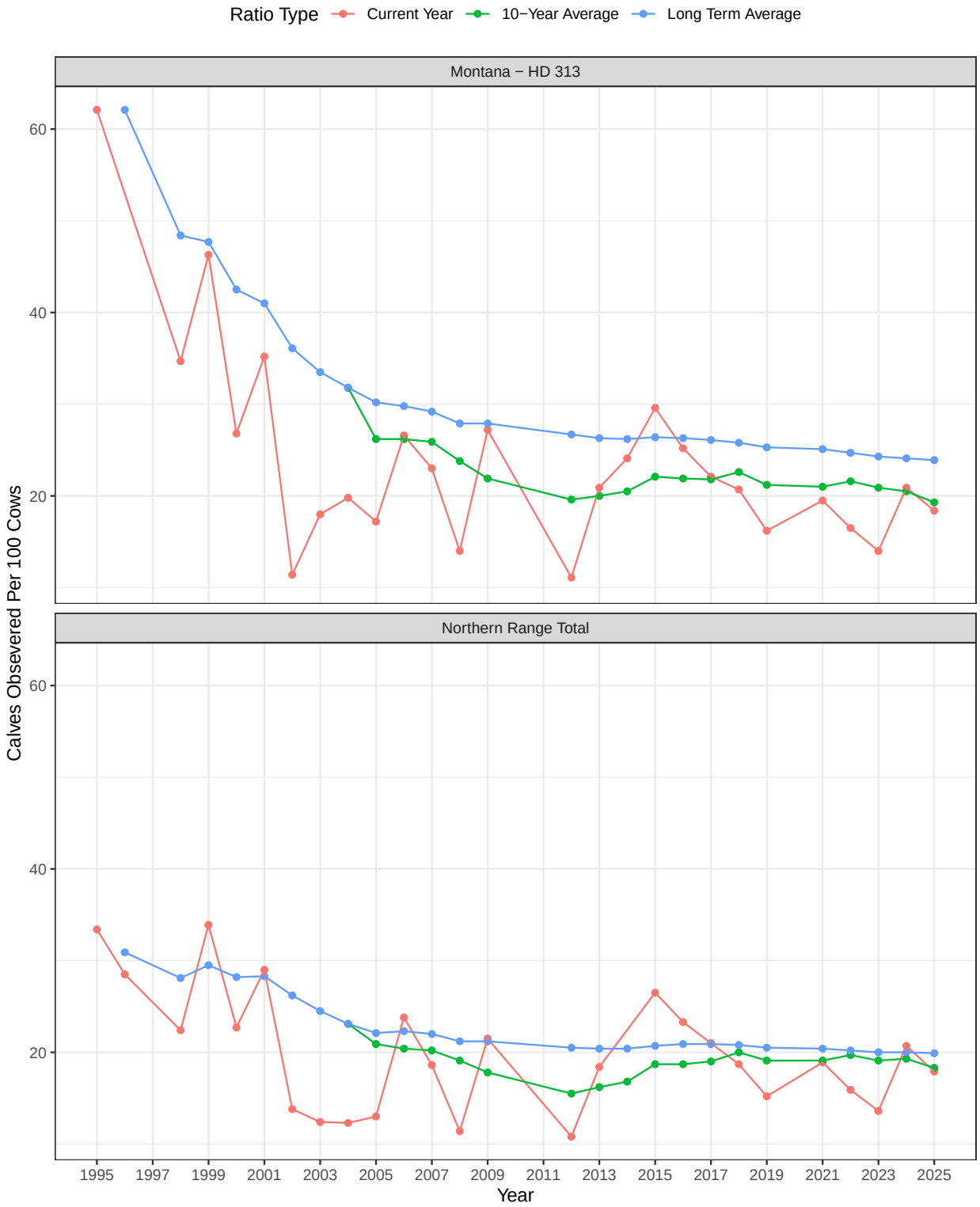

Figure 2: Number of calves observed per 100 cows during late winter classification flights of the Northern Yellowstone Elk Herd, 1995-Present. The Northern Range Total (bottom panel) includes all calves and cows observed in both MT and in YNP. Note that the 10-year average is the average of all surveys spanning 10 years up to and including the year indicated on the X axis; because surveys are usually conducted every year, this average typically includes about 10 surveys, but may include fewer during decades where an annual survey was not conducted. The long-term average includes all data through the year indicated on the X axis.

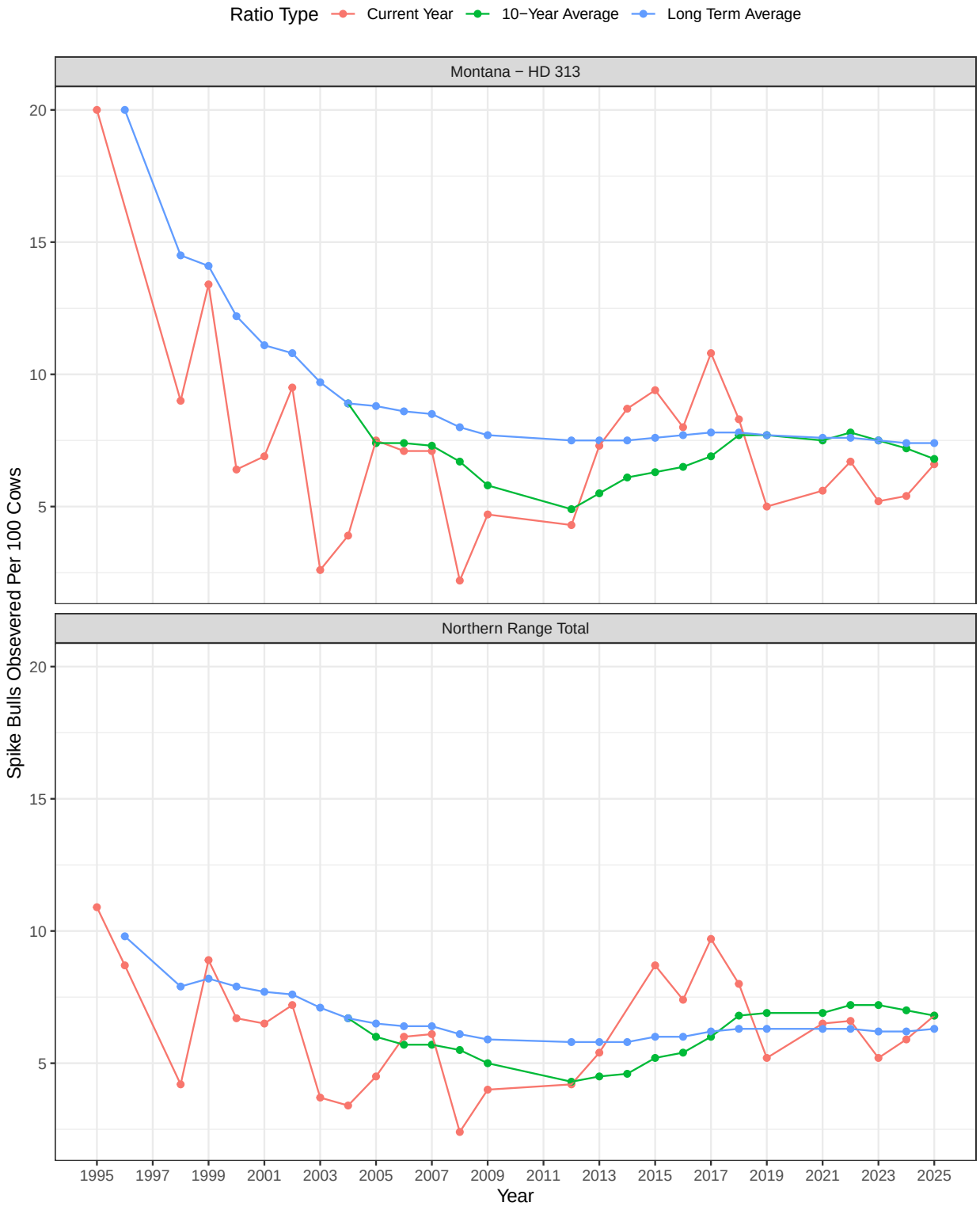

Figure 3: Number of spike bulls observed per 100 cows during late winter classification flights of the Northern Yellowstone Elk Herd, 1995-Present. The Northern Range Total (bottom panel) includes all spikes and cows observed in both MT and in YNP. Note that the 10-year average is the average of all surveys spanning 10 years up to and including the indicated on the year X axis; because surveys are usually conducted every year, this average typically includes about 10 surveys, but may include fewer during decades where an annual survey was not conducted. The long-term average includes all data through the year indicated on the X axis.

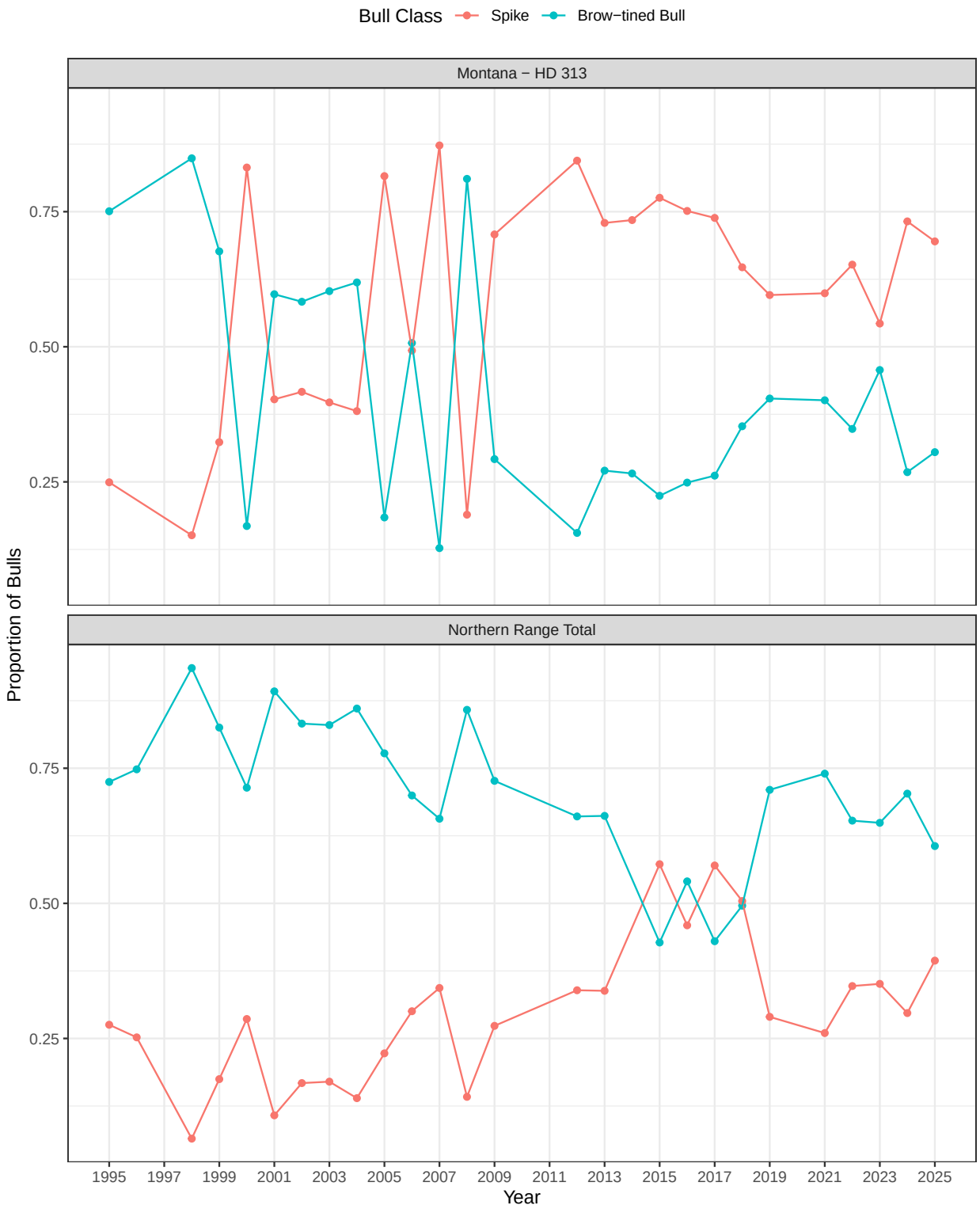

Figure 4: Proportion of all bulls observed during late winter classification flights of the Northern Yellowstone Elk Herd that were spike bulls or brow-tined bulls, 1995-Present. The Northern Range Total (bottom panel) includes all bull elk observed in both MT and in YNP.

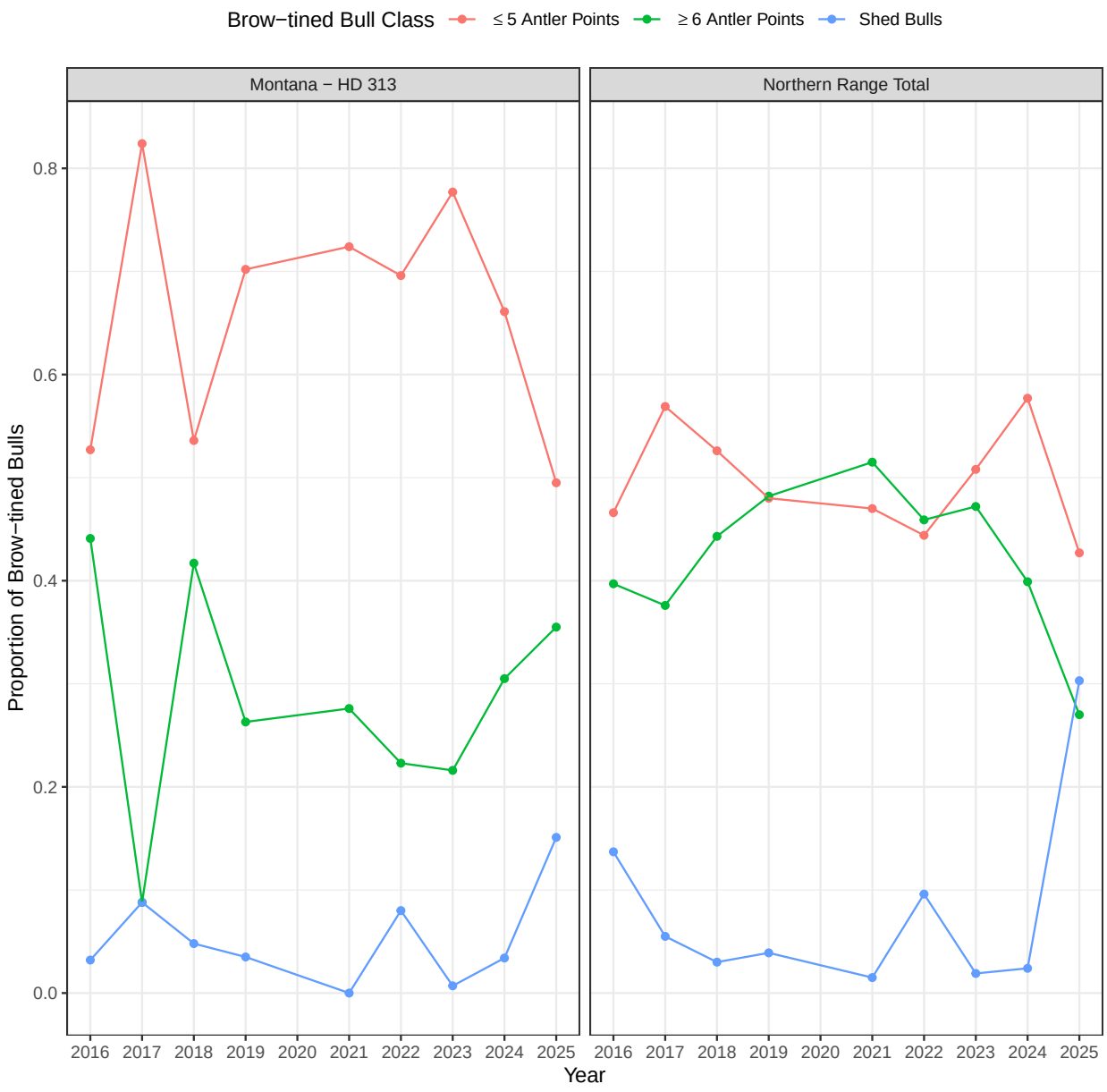

Figure 5: Proportion of brow-tined bulls observed during late winter classification flights of the Northern Yellowstone Elk Herd that were ≤ 5 points on one side, ≥ 6 points on one side, or had shed both antlers, 2016-Present. The Northern Range Total (right panel) includes all bull elk observed in both MT and in YNP.

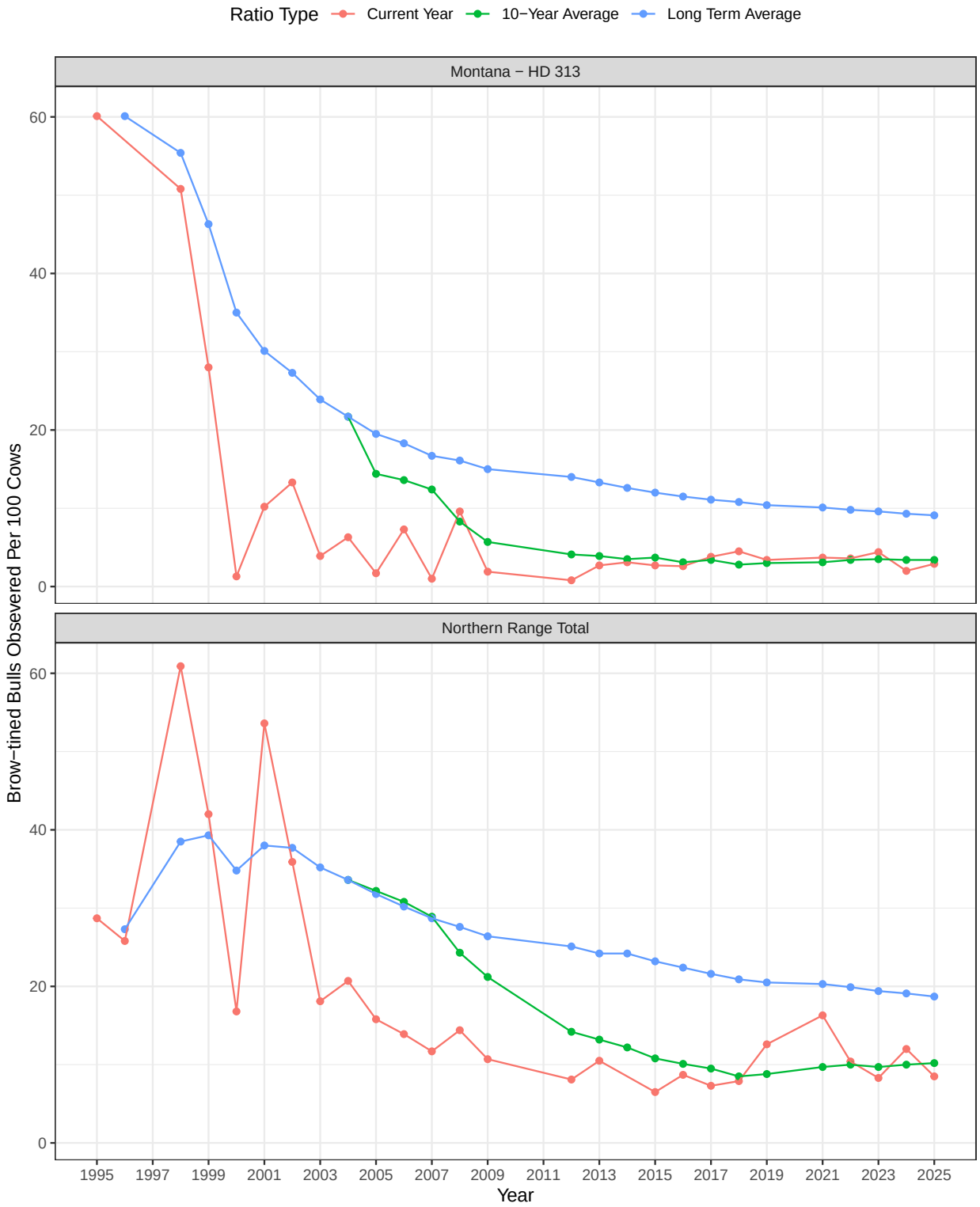

Figure 6: Number of brow-tined bulls observed per 100 cows during late winter classification flights of the Northern Yellowstone Elk Herd, 1995-Present. The Northern Range Total (bottom panel) includes all brow-tined bulls and cows observed in both MT and in YNP. Note that the 10-year average is the average of all surveys spanning 10 years up to and including the year indicated on the X axis; because surveys are usually conducted every year, this average typically includes about 10 surveys, but may include fewer during decades where an annual survey was not conducted. The long-term average includes all data through year indicated on the X axis.

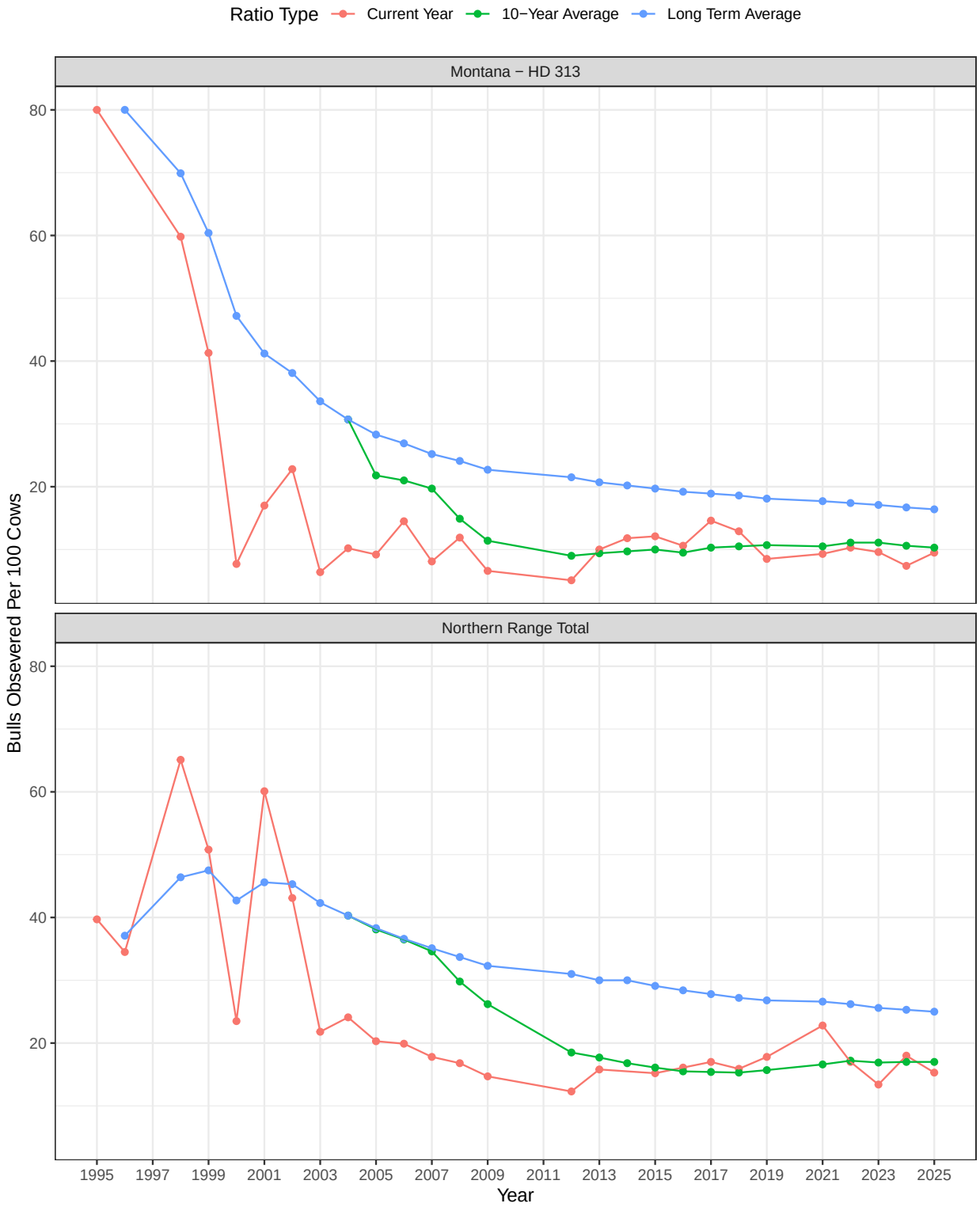

Figure 7: Number of total bulls observed per 100 cows during late winter classification flights of the Northern Yellowstone Elk Herd, 1995-Present. The Northern Range Total (bottom panel) includes all bulls and cows observed in both MT and in YNP. Note that the 10-year average is the average of all surveys spanning 10 years up to and including the year indicated on the X axis; because surveys are usually conducted every year, this average typically includes about 10 surveys, but may include fewer during decades where an annual survey was not conducted. The long-term average includes all data through the year indicated on the X axis.

Harvest History and Management

Note: 2024 Harvest estimates were not available at the time of this report. As such, the narrative below primarily discusses harvest that occurred through the 2023 hunting season. And updated report will be available after the 2024 harvest estimates are finalized. Additionally, the Fish and Wildlife Commission made a boundary adjustment to HD 313 that took effect in 2024. In short, lands west of the Yellowstone River that were previously included in HD 313 are now included in HD 314. **Due to this change, harvest estimates for the northern Yellowstone herd from 2024 onward will not be directly comparable to estimates from prior years.**

In response to declining elk numbers during the 2000s, antlerless harvest opportunity was progressively reduced including a reduction and eventual elimination of the Gardiner late hunt opportunity. In response to improved and stabilizing recruitment in the early 2010s (Figure 2), antlerless harvest opportunity was increased slightly in 2016, with 60 antlerless permits available. As part of the directive to simplify hunting regulations and eliminate antlerless permits during the 2022-2023 season setting process, the antlerless elk permits were replaced with antlerless B licenses. Additionally, 317-00 B licenses may be used in the portion of HD 313 north of Dome Mountain WMA; these B licenses are an important tool for managing game damage and brucellosis concerns.

FWP responded to declining bull ratios (Figures 6 and 7) that was concurrent with increasing bull harvest (Figure 8) by requiring an unlimited permit to hunt bulls in HD 313 beginning in 2012. In 2014, this permit was changed to a first choice only option. These changes were unsuccessful in reducing bull harvest. In 2016, the season structure in HD 313 was changed to allow brow-tined bull harvest with an general license only during the first 3 weeks of the hunting season; bull harvest during the final 2 weeks of the hunting season requires a limited-draw permit.

Although harvest estimates from the 2024 hunting season are not yet available, elk harvest in 2023 was less than in 2022 as a result of early snow in fall 2022 resulted in a substantial migratory push while brow-tined bull harvest was allowed with a general license, (Figures 8 and 9, Table 4). In contrast, fall 2023 was mild, and no major snow event occurred during the general hunting season. Bull harvest is a significant cause of mortality in addition to natural mortality. Although total bull harvest in 2023 was less than in 2022, it was slightly above above the long-term average of bull harvest (long-term average = 226). In 2023, the harvest of both bulls with 5 points or less was similar to previous levels, while the harvest of bulls with 6 or more points declined (Figure 9). The harvest of younger bulls was above the long term average (long-term average = 110), while the harvest of bulls with 6 points or greater was below average (long-term average = 128). Harvest estimates from 2024 will be available later this year.

During the 2024-2025 season setting process, FWP recommended an increase in antlerless opportunity in HD 313, which would have resulted in 50 B licenses for youth and 50 B licenses available to all hunters. However, the Fish and Wildlife Commission adopted an amendment to change the HD 313/314 boundary. The boundary was redrawn so that lands that were previously in HD 313 west of the Yellowstone River are now included in HD 314. As the portion of old HD 313 west of the Yellowstone is winter range for the Northern Yellowstone Elk Herd, that area will still be included in the survey for the Northern Yellowstone Elk Herd, but harvest estimates will no longer be directly comparable to estimates from prior years. In light of the increased elk numbers observed during the 2025 classification survey, FWP will recommend a moderate increase in antlerless opportunity (via the 313-00 and 313-01 B licenses) in HD 313 during the 2026-2027 season setting process.

Treaty-rights harvest by tribal sovereigns occurs outside FWP's management authority. However, FWP works to communicate with tribal partners and encourages tribes to report their harvest so that FWP can work to account for additional harvest that is not captured by FWP's hunter harvest surveys. Current reporting is believed to represent an underestimate of actual harvest, but reporting has improved as communication continues each year. Reported treaty-rights harvest is shown in Table 5.

Figure 8: Estimated total, bull, and antlerless harvest by state-licensed hunters in HD 313, 2000-Present.

Figure 9: Estimated bull harvest by state-licensed hunters in HD 313, 2000-Present.

Table 4: Harvest trends for Northern Yellowstone Elk herd, 2004-2023.

Year	Total Harvest	General Season Harvest	Late Harvest[a]	Antlerless Harvest	Bull Harvest[b]	Proportion Bulls $\geq$ 6 Points[c]
2000	1364	143	1221	1132	229	
2001	1154	51	1103	1020	134	
2002	900	182	718	700	199	
2003	725	23	702	620	105	
2004	544	87	457	421	123	0.88
2005	423	291	132	124	299	0.86
2006	573	449	124	120	453	0.75
2007	243	140	103	102	141	0.53
2008	267	140	127	145	122	0.60
2009	254	163	91	126	128	0.54
2010	379	379	0	88	291	0.69
2011	216	216	0	61	155	0.53
2012	186	186	0	18	168	0.54
2013	187	187	0	22	165	0.53
2014	349	349	0	31	315	0.48
2015	509	509	0	37	472	0.58
2016	154	154	0	52	103	0.25
2017	364	364	0	59	305	0.50
2018	310	296	14	80	230	0.40
2019	321	280	8	84	237	0.38
2020	367	289	22	79	288	0.39
2021	318	232	14	80	237	0.34
2022	335	298	5	37	298	0.43
2023	289	219	13	51	238	0.30

[a] Late harvest prior to 2010 occurred during the Gardiner Late Hunt. Late harvest estimates after 2010 likely represent a subsample of elk harvested in the portion of HD 313 north of Dome Mountain WMA during the HD 317 shoulder season. Late harvest estimates after 2010 should not be considered representative of the total number of shoulder season harvest in either HD 313 or HD 317.

[b] Although a small amount of accidental/illegal harvest of spikes does occur, for practical purposes this column represents the number of brow-tined bulls harvested.

[c] Proportion of bulls harvested with at least 6 antler points on one side.

Table 5: Self-reported elk harvest during treaty-rights hunting in the Gardiner Basin.

Year[a]	**Total Harvest**[b]	**Bull Harvest**	**Antlerless Harvest**
2020	79	19	56
2021	62	20	42
2022	45	11	13
2023	122	28	94
2024	31	12	19

[a] Treaty-rights harvest seasons are managed independently by each tribe and may not align with state-licensed hunting seasons. Here, the year refers to the year during which the state-licensed season occurs, as well as the winter following. E.g. 2024 refers to the fall of 2024 and also the winter of 2024-2025

[b] Some harvests are reported with an unknown sex/age, so the total harvest listed here may be greater than the sum of bull and antlerless harvest.