

2015 LATE WINTER CLASSIFICATION OF NORTHERN YELLOWSTONE ELK

A collaborative survey by the Northern Yellowstone Cooperative Wildlife Working Group

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Introduction

Annual classification surveys of northern Yellowstone elk have been conducted on their winter range since 1968. The Northern Yellowstone Cooperative Wildlife Working Group (NYCWWG) has conducted these classifications since 1986. This group is comprised of resource managers and biologists from Montana Fish, Wildlife, and Parks (MFWP), National Park Service; Yellowstone National Park (YNP), U.S. Forest Service; Gallatin-Custer National Forest (USFS), and U.S. Geological Survey; Northern Rocky Mountain Science Center (USGS). The purpose of the Working Group is to cooperatively preserve and protect the long-term integrity of the northern Yellowstone winter range for wildlife species by increasing our scientific knowledge of the species and their habitats, promoting prudent land management activities, and encouraging an interagency approach to data collection, answering questions, and solving problems.

Methods

The objective of this survey is to classify a representative sample of the northern Yellowstone elk herd in order to estimate the overall sex and age structure of the population. These estimates are used to obtain an index of winter calf survival and recruitment as well as adult and yearling bulls in the population. In past years the Northern Yellowstone Elk classification survey was conducted by sub-sampling the population; the winter range was divided into 4 elevation sectors, and a sample of "units" within each sector was randomly selected with a goal of surveying a representative portion of the population across elevations. The sample was then used to estimate classification of the entire population (Coughenour and Singer 1996). Since 2012, the methods have been altered due to lower numbers of elk which allow for most of the population to be classified. Instead of sampling units, all elevation sectors are searched for elk and efforts are focused on areas where elk are known to be wintering or elk sign is detected.

The 2015 elk classification survey was conducted over 2 days; the Montana portion was surveyed on March 9 and the area within YNP was surveyed on March 10. The classification survey was conducted in conjunction with bighorn sheep surveys, allowing for more of the high elevation bull elk winter range to be included in the survey than is typically feasible. On March 9 we covered all winter range within hunting district 313; from the Yellowstone National Park boundary in Gardiner Basin north to Six-Mile Creek in Paradise Valley. On March 10 we covered most elk winter range on the northern range of YNP from the Mt. Norris/Cache Creek area to the Sepulcher Mountain foothills (Figure 1). We traveled in a Jet Ranger helicopter piloted by Neil Cadwell of MFWP. MFWP Biologist Karen Loveless was the primary observer and pilot Neil Cadwell assisted with spotting and classifications. Elk were classified as cow, calf (<1 year old), mature bull (brow-tined), or yearling bull ("spike").

The 2014 classification survey was restricted to the Montana portion of the range due to logistical issues. Therefore the 2015 total classification results are presented in comparison to the 2013 results because that is the most recent complete survey. The results for the Montana portion of the survey are presented in comparison to the 2014 Montana survey results.

Results

The 2015 survey was conducted on March 9 and 10. Overall conditions were very good; temperatures ranged from 26° to 32°. Skies were clear to partly cloudy, winds were calm except for 15-20 mph winds over the Dome Mountain area, and there was no precipitation. Flight times on both March 9 and 10 including ferry and survey time was 3.5 hours at \$425 per hour for a total daily cost of \$1487.50. The entire flight costs for the 2-day survey was \$2,975, split evenly by YNP and MFWP.

We classified a total of 3,930 elk by age and sex, including 2,773 cows, 736 calves and 421 bulls (241 yearling bulls and 180 brow-tined bulls). The resulting age and sex ratios were 26.5 calves and 15.2 bulls per 100 cows. The ratio of 15.2 bulls per 100 cows included 8.7 yearling bulls (spikes), and 6.5 brow-tined bulls per 100 cows (Table 1). Calf and bull ratios varied by elevation sector. Calf ratios ranged from a high of 50 calves per 100 cows in the upper elevation sector to a low of 15.3 calves per 100 cows within the lower inside sector in YNP. Bull ratios ranged from a low of 12.1 bulls per 100 cows within Montana, to a high of 31.1 bulls per 100 cows in the upper elevation sector in YNP (Table 1).

The observed ratio of 26.5 calves per 100 cows is an increase from the ratio of 18.4 calves per 100 cows observed in 2013 and above the 21-year average of 20.7 calves per 100 cows observed during 1995-2015. Calf ratios have ranged 10.8 – 33.9 calves per 100 cows since 1995, with below average calf ratios observed during most surveys since 2002 (Table 2, Figure 2).

The observed ratio of 15.2 total bulls per 100 cows is very similar to results of 15.8 bulls per 100 cows observed in 2013, and lower than the 21-year average of 29.1 bulls per 100 cows. The observed ratio of 6.5 brow-tined bulls per 100 cows is the lowest observed since surveys began, however the observed ratio of 8.7 yearling bulls per 100 cows is above recent and long-term averages (Table 2, Figure 4).

Discussion

In order to achieve a stable or increasing elk population, production and survival of calves must equal or surpass rates of natural and human caused mortality among the adult population. Antlerless elk mortality in this population is primarily due to natural causes; antlerless harvest has been below 3% of the observed population since 2005, and since 2012 antlerless harvest has represented less than 1% of the observed population. Predation continues to be a significant source of mortality however this year we observed higher calf recruitment as well as higher overall elk numbers during our annual trend survey (see YNP report: 2015 Annual Winter Trend Count of Northern Yellowstone Elk). Calf recruitment of 26.5 calves per 100 cows observed this year is above the recent and long-term averages, and above the lower threshold of 20 calves per 100 cows specified by Montana's Elk Management Plan for hunting district 313. Calf recruitment was below average during most surveys since 2002, and during that time numbers of elk observed during annual trend surveys declined from 11,969 elk in 2002 to 3,915 elk observed in 2013. The 2015 trend survey resulted in an increase to 4,844 observed elk, possibly indicating that the declining population trend may be stabilizing.

Bull harvest continues to be a significant cause of mortality in addition to natural mortality (Table 2). The proportion of yearling bulls is an important indicator as it represents future recruitment of mature bulls into the population, and also serves as a rough indicator of the proportion of yearlings surviving to their second year. The 2015 results of 8.7 yearling bulls per 100 cows indicate increased yearling survival as compared to

surveys conducted during 2008 - 2013 which resulted in ratios ranging between 2 – 5 yearling bulls per 100 cows. In spite of this observed increase in yearling bull ratios, mature bull ratios for the entire herd declined this year to an all time low of 6.5 brow-tined bulls per 100 cows. Mature bull ratios within the Montana portion have remained stable at 2.7 – 3.1 brow-tined bulls per 100 cows for 3 years, having increased slightly from the low of 0.8 brow-tined bull per 100 cows observed in 2012. Harvest of brow-tined bulls has increased in recent years in spite of the long-term decline in elk numbers; the most recent 10-year average is higher than the long term average, and the 2014 harvest of 315 brow-tined bulls is the highest harvest since 2006 and the second highest harvest since 1994. The increased bull harvest corresponding with reduced overall elk numbers results in an increasingly greater proportion of the bull population being harvested annually (Figures 5 & 6).

In recent years an increasing proportion of the northern Yellowstone elk herd has migrated out of the Park to winter in Montana (See MFWP report: Winter 2015 Hunting District 313 Elk Survey). During 1990 – 2005 the average proportion of the elk herd that migrated north of YNP to winter range in Montana was 31%. Since 2006 over 50% of the herd has migrated each year, and 77% of the herd has migrated each year since 2013. This results in an increasing proportion of the herd being subject to harvest upon crossing the boundary from the protected area of YNP into hunting district 313 in Montana. The low numbers of brow-tined bulls observed during recent surveys in spite of increased yearling bull recruitment is likely a result of increased proportions of the bull population becoming available for harvest due to increased migration out of YNP.

In response to declining bull ratios and increased vulnerability to harvest, MFWP instituted an unlimited permit season structure in HD 313 beginning in 2012, and further restricted the structure in 2014 by designating the permits as “first-choice only” for applicants. In spite of the increasingly restrictive season structure, brow-tined bull harvest has continued to increase. During fall of 2015 MFWP will be developing proposals for season structure changes for the 2016-2017 seasons. Prior to this the local staff will be engaging in discussions with sportsmen, outfitters, landowners and other interested persons in order to consider input on potential season structure changes. The objective for MFWP will be to identify options for an improved season structure that will be biologically effective in allowing brow-tined bull ratios to improve, while also meeting with reasonable social support among the variety of stakeholders. Any proposals for a season structure change will be subject to public comment during the season setting process of January 2016, and must be approved by the Montana Fish and Wildlife Commission.

Table 1. Results of northern Yellowstone elk classification survey by elevation sector, March 2015

Area	Cows	Calves	Spikes	Brow-tined Bulls	Total Bulls	Total Elk Classified	Calves per 100 Cows	Yearling Bulls per 100 cows	Brow-tined Bulls per 100 Cows	Total Bulls per 100 Cows
Montana (HD313)	1769	524	166	48	214	2507	29.6	9.4	2.7	12.1
Yellowstone Park	Lower	485	74	34	30	64	15.3	7.0	6.2	13.2
	Middle	429	93	36	79	115	21.7	8.4	18.4	26.8
	Upper	90	45	5	23	28	163	50.0	5.6	25.6
Total	2773	736	241	180	421	3930	26.5	8.7	6.5	15.2

Figure 1. Location and group size of elk observed during the March 2015 elk classification survey, including northern range count units surveyed.

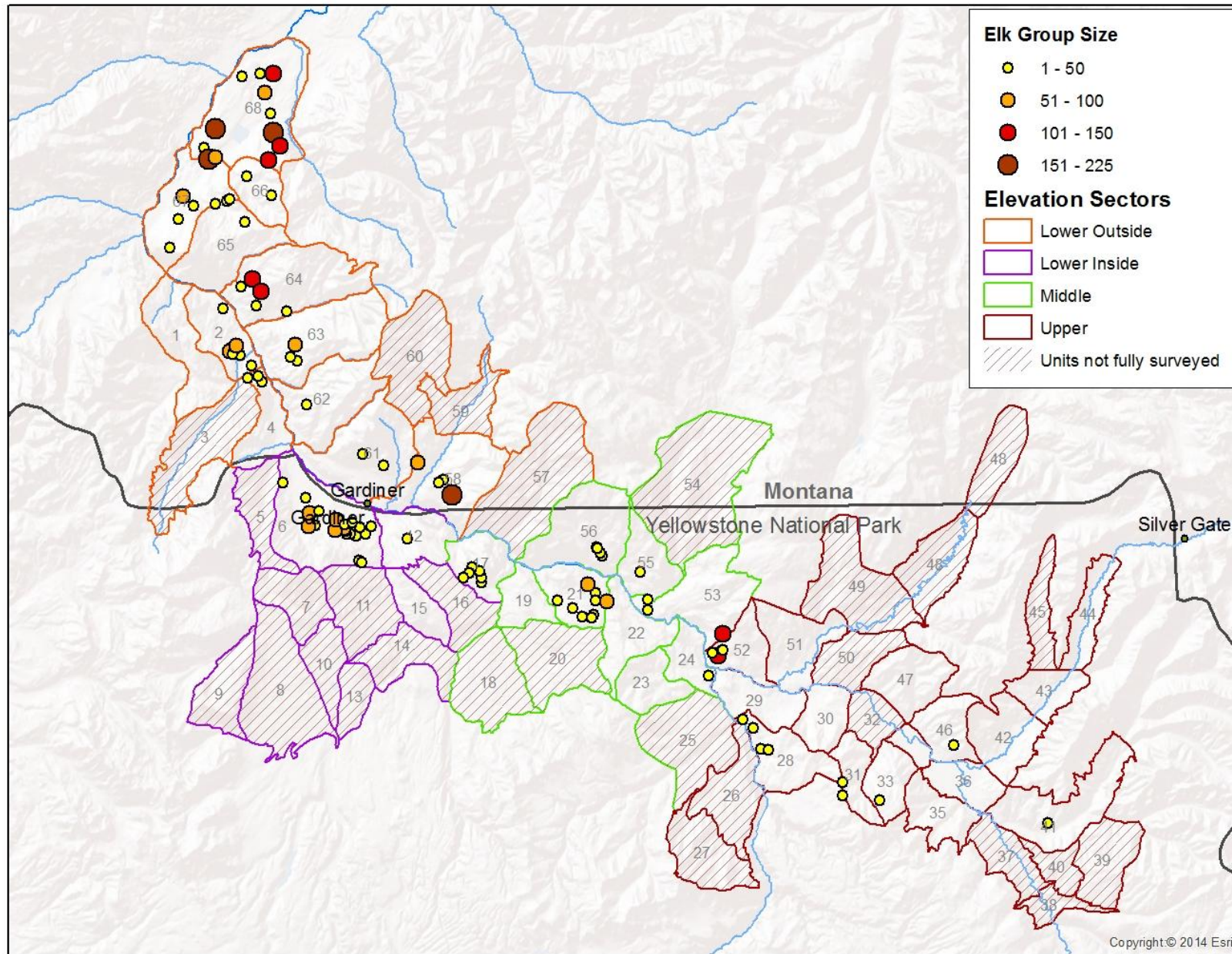


Table 2. Late winter helicopter classification survey results for northern Yellowstone elk, 1995-2015 and annual brow-tined bull harvest. The “Total Northern Range” results include elk classified within the Montana and Yellowstone National Park portions of the range; “Montana Only” results include only those elk classified north of Yellowstone National Park in hunting district 313.

Year	Total Northern Range					Montana Only					
	Total Elk Classified	Total Calves: 100 Cows	Total Yearling bulls: 100	Total Adult Bulls:100 cows	Total Bulls: 100 cows	MT Elk Classified	MT Calves: 100 Cows	MT Yearling bulls: 100 cows	MT Adult Bulls: 100 cows	MT Bulls: 100 Cows	Bulls Harvested
1995	3,613	33.4	10.9	28.7	39.7	983	62.1	20.0	60.1	80.0	220
1996	2,921	28.5	8.7	25.8	34.5	survey restricted to YNP					144
1997			no survey			no survey					98
1998	2,720	22.4	4.2	60.9	65.1	387	34.7	9.0	50.8	59.8	86
1999	4,055	33.9	8.9	42.0	50.8	1,685	46.3	13.4	28.0	41.3	131
2000	3,157	22.7	6.7	16.8	23.5	1,773	26.8	6.4	1.3	7.7	229
2001	1,869	29.0	6.5	53.6	60.1	644	35.2	6.9	10.2	17.0	134
2002	4,001	13.8	7.2	35.9	43.1	1,200	11.4	9.5	13.3	22.8	200
2003	4,200	12.4	3.7	18.1	21.8	1,315	18.0	2.6	3.9	6.4	105
2004	3,167	12.3	3.4	20.7	24.1	1,075	19.8	3.9	6.3	10.2	123
2005	3,508	13.0	4.5	15.8	20.3	1,039	17.2	7.5	1.7	9.2	299
2006	3,649	23.8	6.0	13.9	19.9	2,116	26.6	7.1	7.3	14.5	453
2007	4,828	18.6	6.1	11.7	17.8	1,646	23.0	7.1	1.0	8.1	141
2008	3,656	11.4	2.4	14.4	16.8	2,578	14.0	2.2	9.6	11.9	122
2009	4,269	21.5	4.0	10.7	14.7	1,793	27.2	4.7	1.9	6.6	128
2010			no survey			no survey					291
2011			no survey			no survey					155
2012	5,146	10.8	4.2	8.1	12.3	2,065	11.1	4.3	0.8	5.1	168
2013	3,507	18.4	5.4	10.5	15.8	1,257	20.9	7.3	2.7	10.0	167
2014		(survey restricted to north of YNP)				2,772	24.1	8.7	3.1	11.8	315
2015	3930	26.5	8.7	6.5	15.2	2,507	29.6	9.4	2.7	12.1	
10-Year Average (2006-2015)		18.7	5.2	10.8	16.1		22.1	6.4	3.7	10.0	215.6
Previous 11-Year Ave (1995-2005)		22.1	6.5	31.8	38.3		30.2	8.8	19.5	28.3	160.8
21-Year Average (1995-2015)		20.7	6.0	23.2	29.1		26.4	7.6	12.0	19.7	185.5

Figure 3. Calf ratio trends for total northern Yellowstone elk herd and for Montana portion of the range.

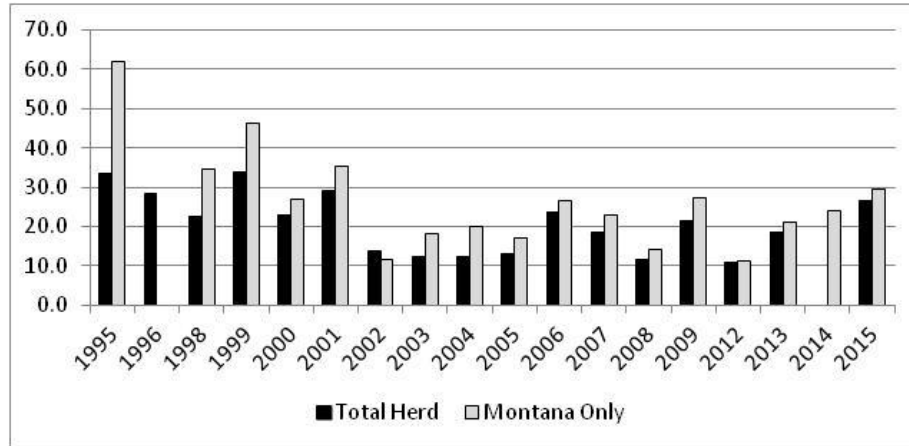


Figure 4. Trends of yearling and brow-tined bull ratios for total northern Yellowstone elk herd

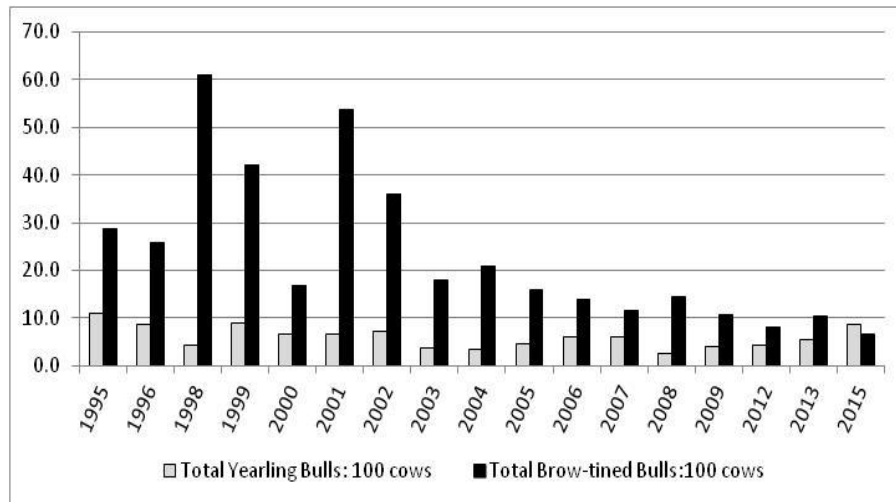


Figure 5. Number of bulls harvested annually in relation to elk population trends (missing data indicate no survey or poor survey conditions)

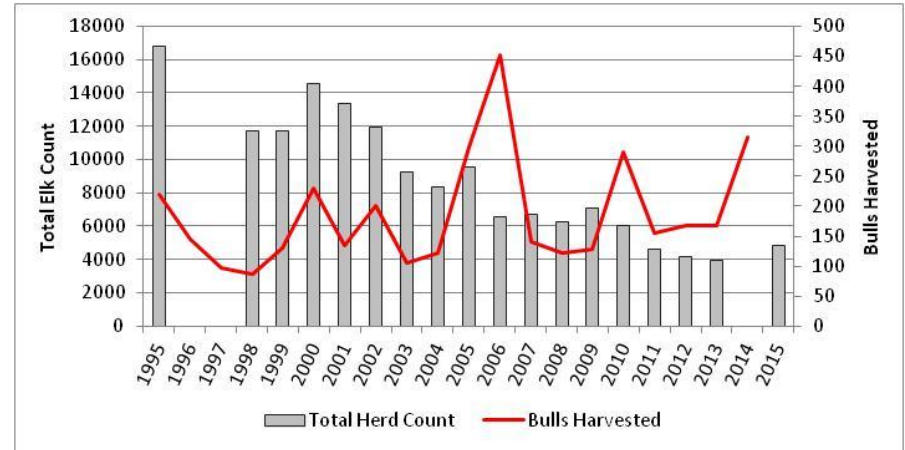


Figure 6. Number of bulls harvested annually in relation to estimated total brow-tined bulls (BTB) in the late winter population.

