

MOOSE

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2015 - JCR Evaluation Form

SPECIES: Moose

PERIOD: 6/1/2015 - 5/31/2016

HERD: MO313 - BIGHORN

HUNT AREAS: 1, 34, 42

PREPARED BY: TIM THOMAS

	<u>2010 - 2014 Average</u>	<u>2015</u>	<u>2016 Proposed</u>
Trend Count:	91	120	120
Harvest:	64	28	24
Hunters:	74	33	30
Hunter Success:	86%	85%	80%
Active Licenses:	74	33	30
Active License Success	86%	85%	80%
Recreation Days:	496	296	200
Days Per Animal:	7.8	10.6	8.3
Males per 100 Females:	82	54	
Juveniles per 100 Females	45	31	

Trend Based Objective ($\pm 20\%$) 110 (88 - 132)

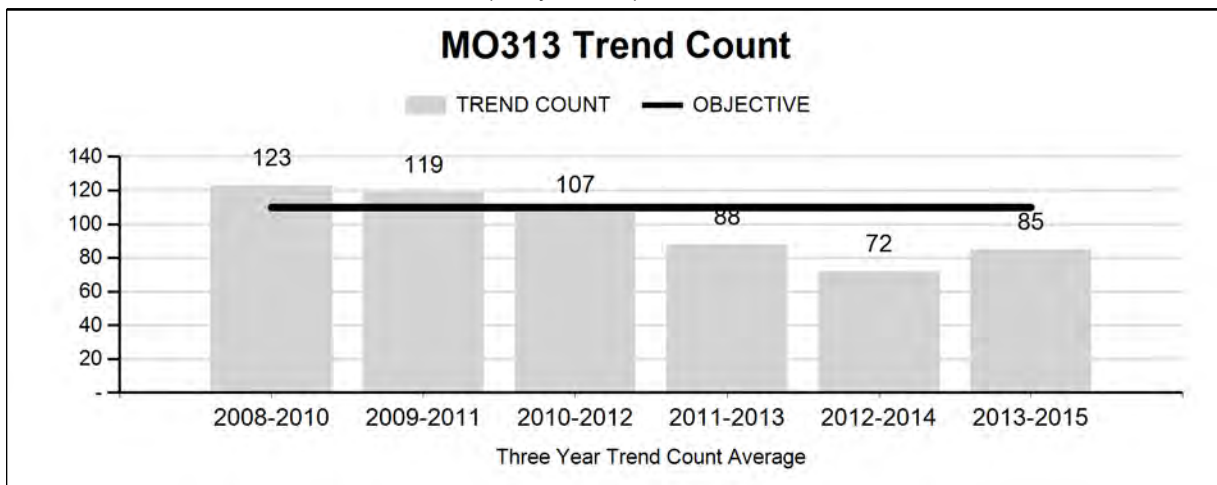
Management Strategy: Special

Percent population is above (+) or (-) objective: 9%

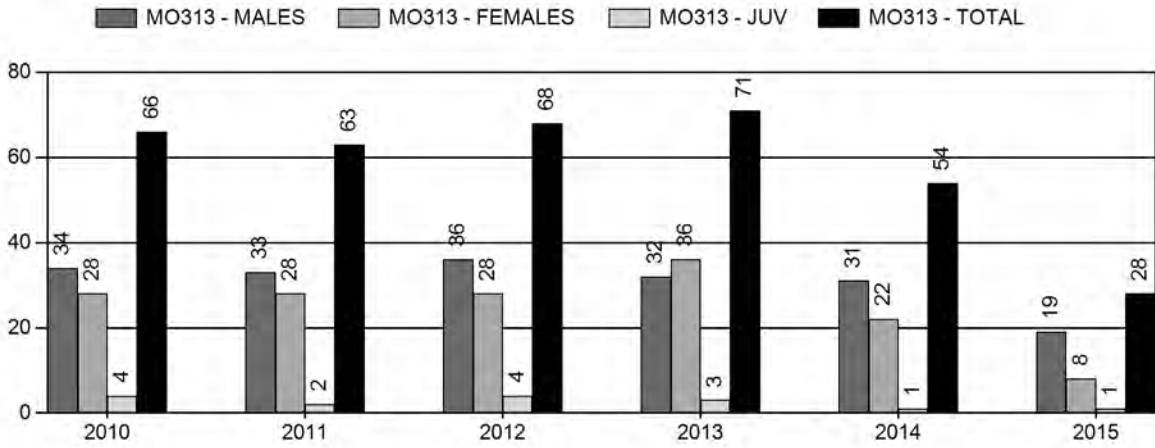
Number of years population has been + or - objective in recent trend: 1

Proposed harvest rates (percent of pre-season estimate for each sex/age group):

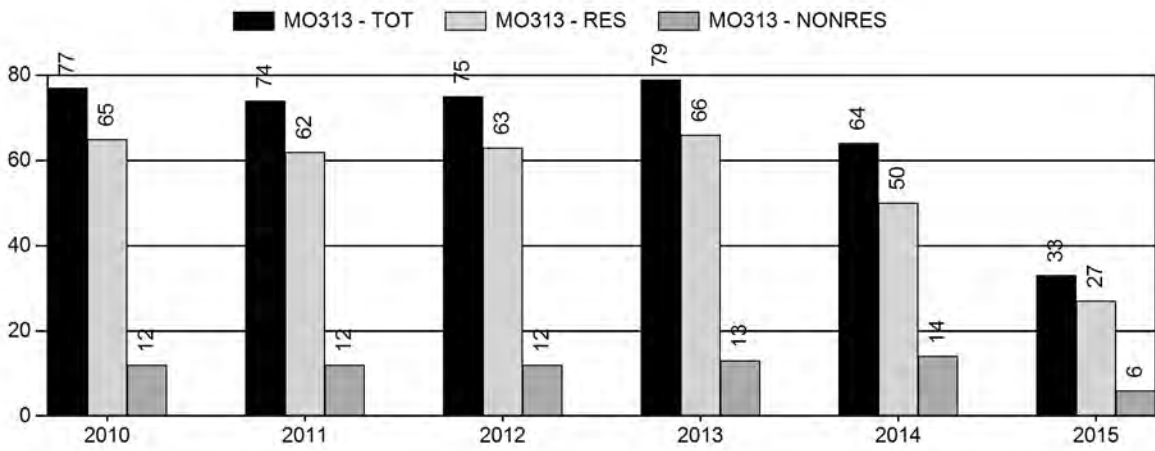
	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	7%	7%
Males ≥ 1 year old:	18%	18%
Juveniles (< 1 year old):	0%	0%



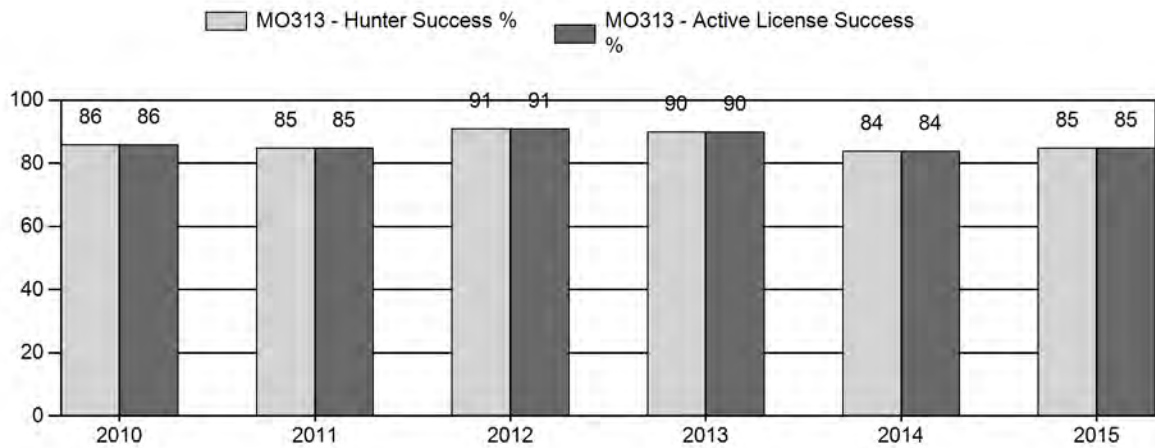
Harvest



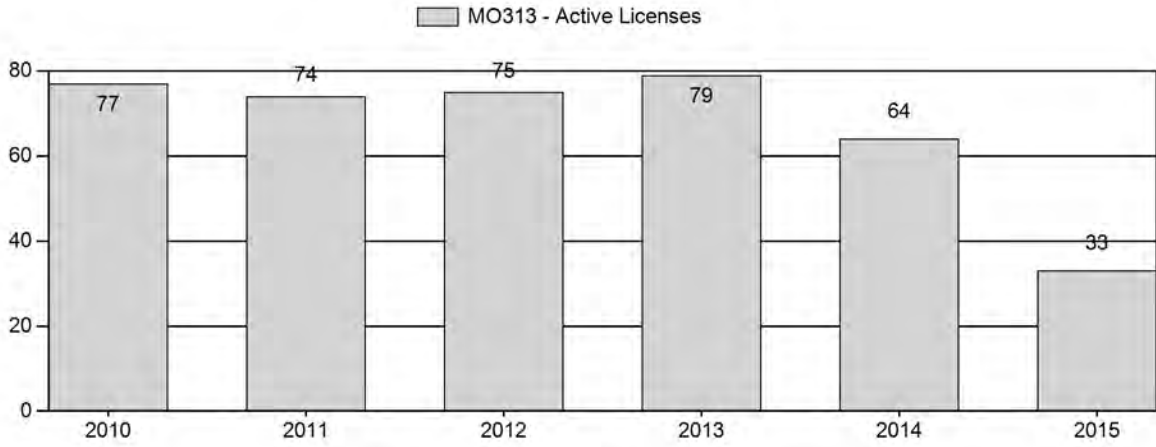
Number of Hunters



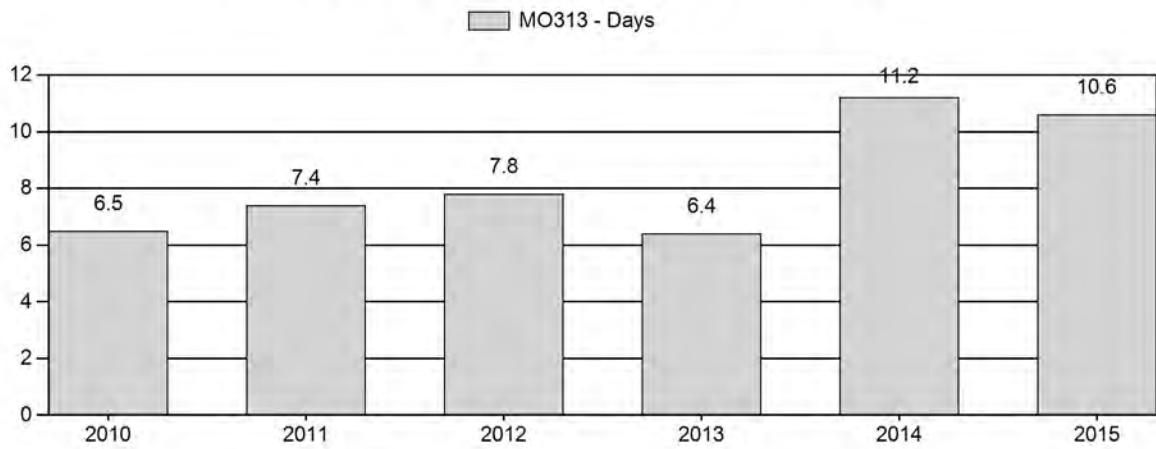
Harvest Success



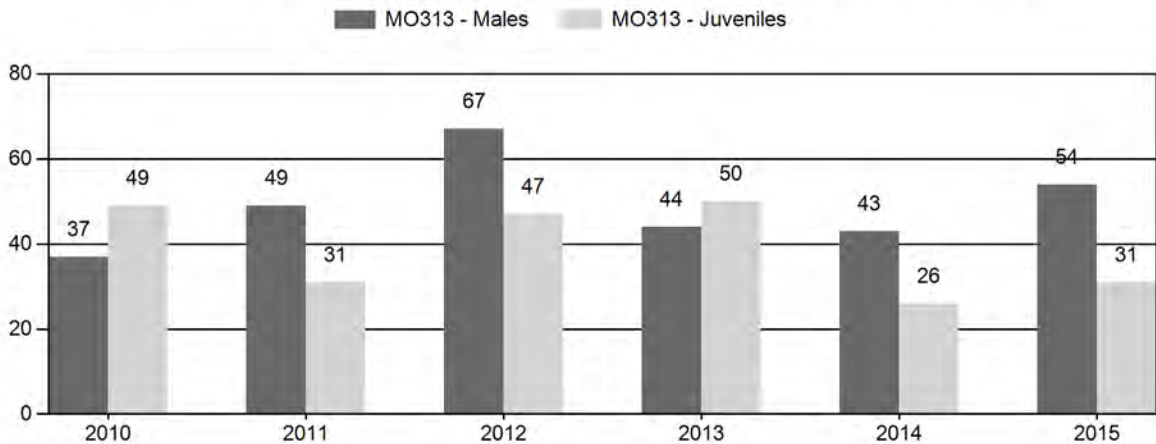
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2010 - 2015 Preseason Classification Summary

for Moose Herd MO313 - BIGHORN

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			YIng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2010	584	4	11	15	20%	41	54%	20	26%	76	353	10	27	37	± 0	49	± 0	36
2011	538	2	17	19	27%	39	56%	12	17%	70	331	5	44	49	± 0	31	± 0	21
2012	529	1	9	10	31%	15	47%	7	22%	32	396	7	60	67	± 0	47	± 0	28
2013	495	0	7	7	23%	16	52%	8	26%	31	326	0	44	44	± 0	50	± 0	35
2014	360	2	8	10	26%	23	59%	6	15%	39	239	9	35	43	± 0	26	± 0	18
2015	350	3	24	28	29%	52	54%	16	17%	96	248	6	46	54	± 0	31	± 0	20

**2016 HUNTING SEASONS
BIGHORN MOOSE HERD (MO313)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
1	1	Oct. 1	Oct. 31	10	Limited quota	Any moose, except cow moose with calf at side
	4	Oct. 1	Oct. 31	5	Limited quota	Antlerless moose, except cow moose with calf at side
34	1	Oct. 1	Oct. 31	5	Limited quota	Any moose, except cow moose with calf at side
	4	Oct. 1	Oct. 31	5	Limited quota	Antlerless moose, except cow moose with calf at side
42	1	Oct. 1	Oct. 31	5	Limited quota	Any moose, except cow moose with calf at side

Special Archery Season Hunt Areas	Season Dates		Limitations
	Opens	Closes	
1, 34, 42	Sep. 15	Sep. 30	Refer to Section 2 of this Chapter

Hunt Area	Type	Quota change from 2015
34	4	- 5
Herd Unit Total	1	No Change
	4	- 5

Management Evaluation

Current Trend Count Management Objective: 110 (88-132)

Management Strategy: Special

2015 Trend Count: 120

Most Recent 3-year Running Average Trend Count: 85*

*No survey in Hunt Area 42 in 2013 and 2014

Herd Unit Issues

The management objective for the Bighorn Moose Herd Unit is a trend count objective of 110 moose, with a desired distribution of approximately 50 moose in Hunt Area 1, 30 moose in Hunt Area 34, and 30 moose in Hunt Area 42. Secondary management objectives are to maintain a median age of harvested bulls of ≥ 4.5 years and to have at least 40% of the harvested bulls be ≥ 5 years old.

The management strategy for all moose herd units is special management, emphasizing trophy quality opportunities. The objective and management strategy for this herd unit were last reviewed and updated in 2015, when the objective was changed to a Trend Count objective from a post-season population objective based on simulation modeling.

Weather

The spring and summer of 2015 was relatively warm and wet, resulting in good forage production throughout the growing season in the Bighorn Mountains. The fall of 2015 was generally warm, dry and open. The winter of 2015-16 was generally warmer and drier than normal. There was a record El Nino effect in the Pacific Ocean influencing weather patterns in the intermountain west during later 2015 – 2016, resulting in generally warmer and drier conditions for the Bighorn Mountains. Snow fall was significantly below average during the 2015-16 winter. Moose appear to have entered the winter in good condition, allowing them to survive the winter fairly well.

Moose appear to be sensitive to warmer temperatures, showing signs of increased metabolic rates or heat stress at about 23° F during winter months and 57° F during summer months. Recent research conducted in Massachusetts and Minnesota suggests moose move to thermal cover to avoid heat stress during warm weather. This can alter feeding and movement patterns. Long-term consequences or effects on fitness of warming climates are not currently well understood.

Habitat

We do not have an established habitat transect in this herd unit. Range personnel with the Bighorn National Forest have collected willow transect information at various locations on the Bighorn Mountains, the primary range for moose in this herd unit. In general, taller willow species seem to be decreasing and shorter willow species seem to be maintaining or increasing. We believe taller willow species tend to be more desired browse species for big game such as moose. Taller willows produce more biomass than smaller willows, generally increasing the amount of forage available. As such, there has been a decline in a preferred forage plant over time, reducing the carrying capacity for moose. Some willow habitat is relatively linear, such as along drainages on the west side in Hunt Area 42, limiting moose distribution.

Field Data

Field personnel classify moose in Hunt Areas 1 and 34 annually. In recent years, these surveys were conducted using aerial survey techniques from a Bell 206B JetRanger III helicopter. Hunt Area 1 is surveyed in late August, and Hunt Area 34 is surveyed during late November – mid-January, depending on survey conditions, snow cover, and aircraft availability.

Classification counts in Area 42 have been collected sporadically over the years, usually incidental to other duties during July and August. An effort was initiated in 2015 to systematically survey Area 42 using ground count routes during mid-summer. Specific survey routes were established by the Greybull Wildlife Biologist.

Survey results can vary significantly between years, often without easily discernible rationale, making interpretation of data difficult at best (Fig.1). Over time, trends in survey counts can be observed and may provide insight to general population dynamics. We do obtain a known annual minimum population from these surveys.

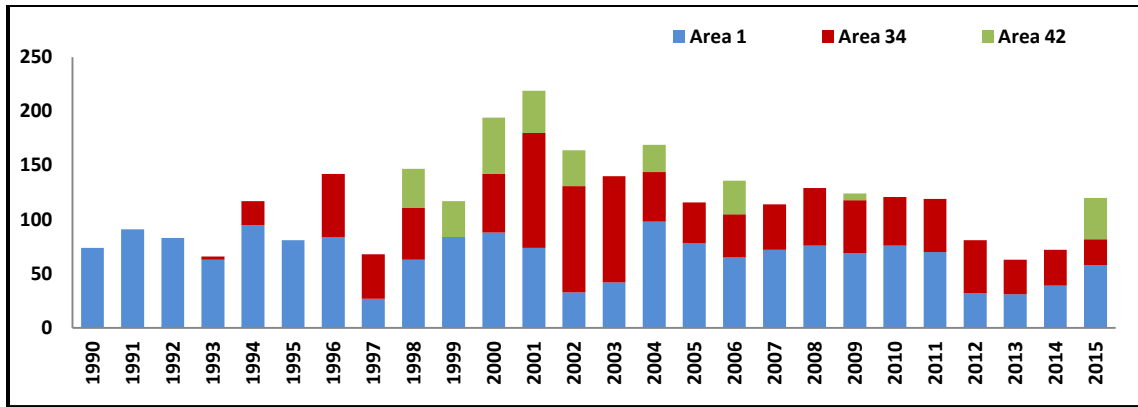


Figure 1. Moose classification/trend counts in Bighorn Herd Unit 1990 – 2015. Area 1 is surveyed in late August of each year. Area 34 is surveyed in later November – January of each year. Area 42 is periodically surveyed during mid-late summer incidental to other activities.

During 2015, we classified 58 moose in Area 1 (Fig. 2), an increase from 2014 and the highest count in four years. This was still well below the long-term (n=26 years) average count of 67 moose. We observed only 15 moose in the Goose Creek drainage the past 4 years (n=3 in 2012; n=4 in 2013; n=4 in 2014; n=4 in 2015). This drainage used to support many more moose. We observed 71 bulls per 100 cows, an increase from the past two years. We observed 10 calves during the survey, for a ratio of 36 calves per 100 cows, an increase from the previous year and similar to the long-term average of 38 calves per 100 cows.

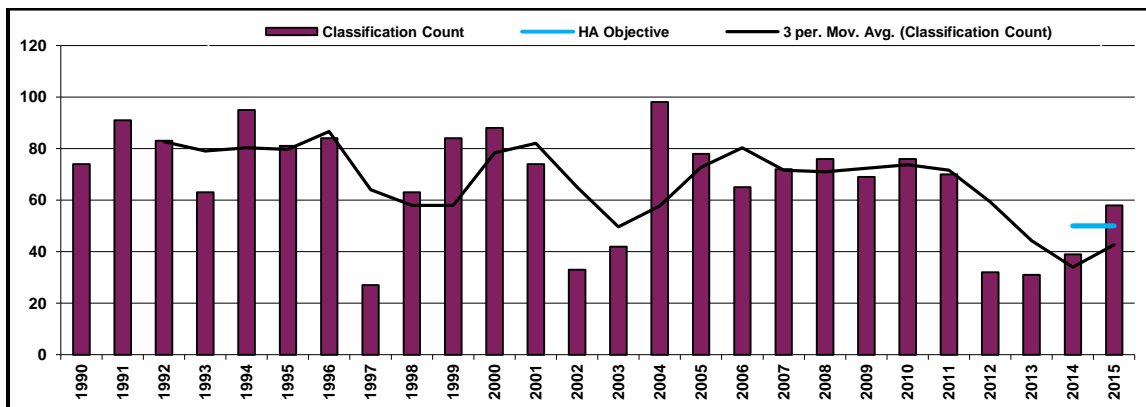


Figure 2. Moose classification/trend counts in Hunt Area 1 of the Bighorn Herd Unit 1990 – 2015. Area 1 is surveyed in late August of each year using aerial survey techniques. The sub-objective for Area 1 is 50 moose.

In Area 34, we classified only 24 moose during 2015 (Fig. 3), the lowest classification count since 1994 (n=22). This is the third year in a row with a decline in this classification survey. We observed 100 bulls and 67 calves per 100 cows. Post-season calf to cow ratio may be skewed upward due to selective harvest of barren cows due to hunting regulations (i.e. cow without calf at side). Low sample size for both areas makes it difficult to have confidence that these ratios accurately reflect the population dynamics of this herd.

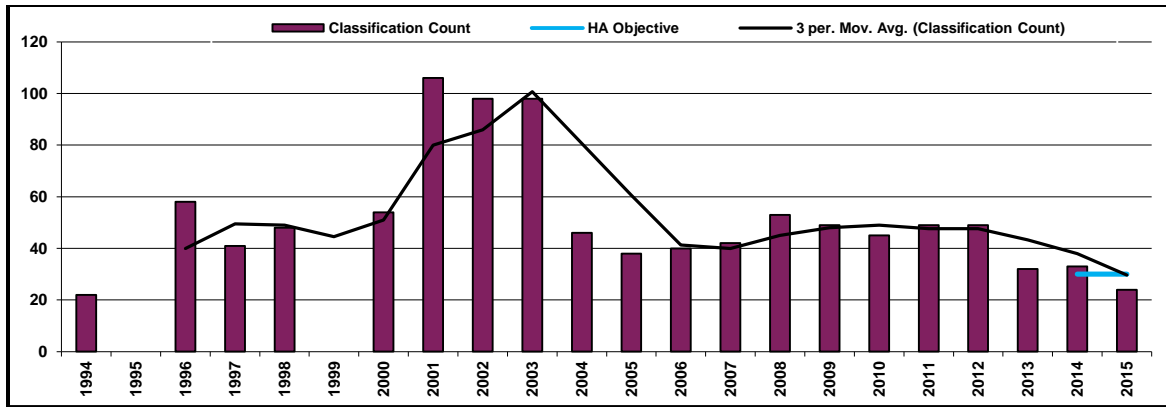


Figure 3. Moose classification/trend counts in Hunt Area 34 of the Bighorn Herd Unit 1994 – 2015. Area 34 has been surveyed during mid-November – January using aerial surveys techniques since 2001. The sub-objective for Area 34 is 30 moose.

An effort was initiated in 2015 to systematically conduct a classification survey in Area 42 for the first time since 2006. We counted 38 moose during ground surveys in late June (Fig. 4). We observed 33 males per 100 females and 25 calves per 100 females. Both ratios are below desired levels. This could be a function of low sample size or could be truly representative of the population. We will get a better feel as we continue to collect annual survey data in this hunt area in future years.

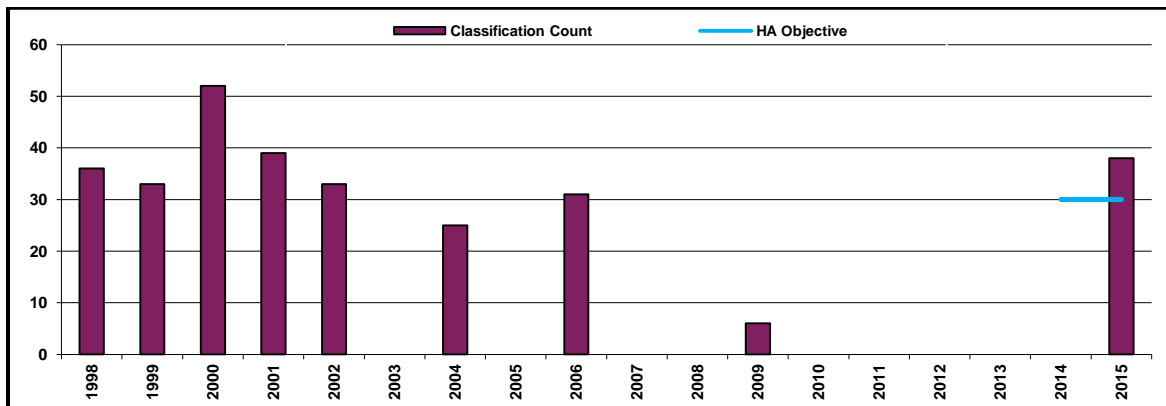


Figure 4. Moose classification/trend counts in Hunt Area 42 of the Bighorn Herd Unit 1998 – 2015. Area 42 has generally been surveys in mid-summer using ground survey techniques. The sub-objective for Area 42 is 30 moose.

Teeth were collected from hunter harvested moose, generally through voluntary submission by successful hunters. Median age of males harvested in 2015 was 5 years old (mean = 4.8, n = 17, range = 3-9 yrs old), similar to 2014 harvested moose, and above the minimum desired median age threshold of ≥ 4.5 years old (Fig. 5). Fifty three percent of the harvested males were ≥ 5 years old, above the minimum desired level of 40% (Fig. 6), and a slight decrease from 2014. Hunters seemed to be more selective in 2015, possibly accounting for no 2 or 3 year old bulls being harvested. Also, access during most of October was good as weather conditions were relatively mild and open, allowing hunters more opportunity to pursue moose.

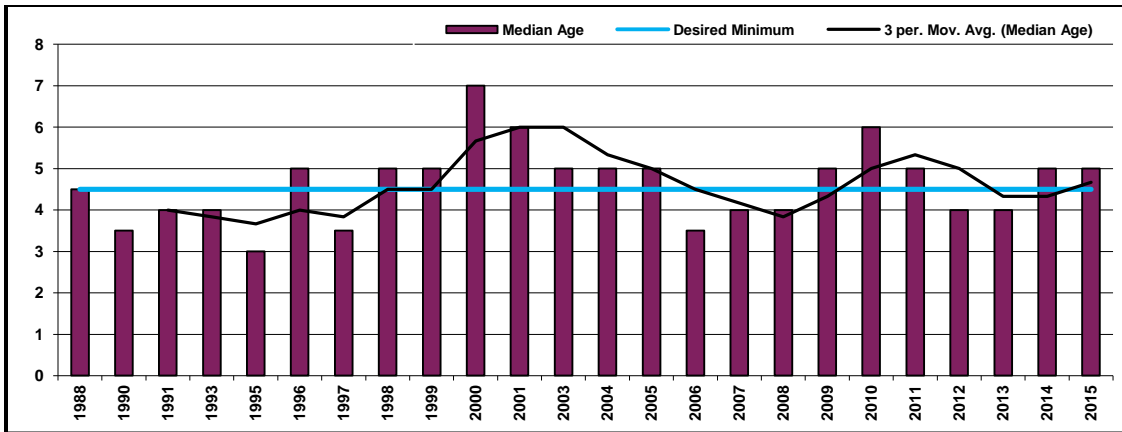


Figure 5. Median age of harvested bull moose in Bighorn Herd Unit. Teeth aged by cementum analyses. Only male moose ≥ 1 year old included in analysis.

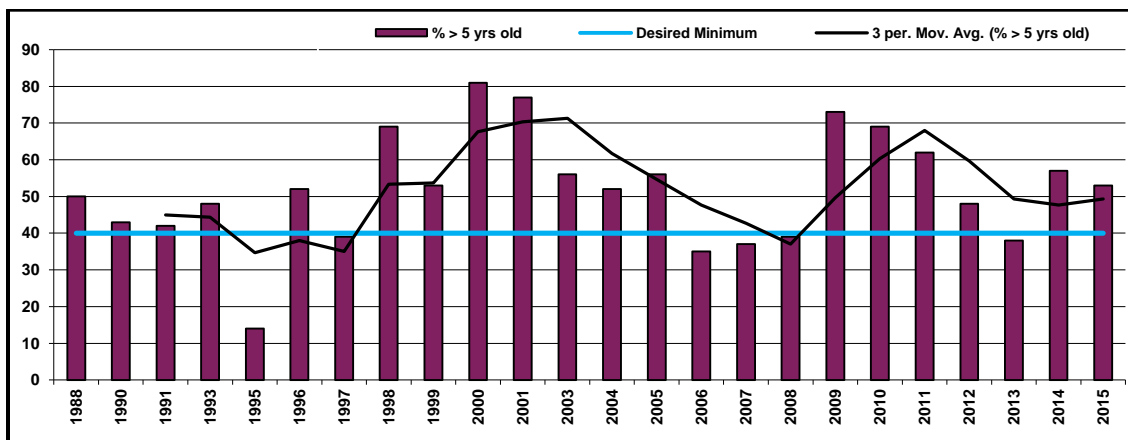


Figure 6. Percentage of harvested bull moose ≥ 5 years old by year. Teeth aged by cementum analyses. Only male moose ≥ 1 year old included in analysis.

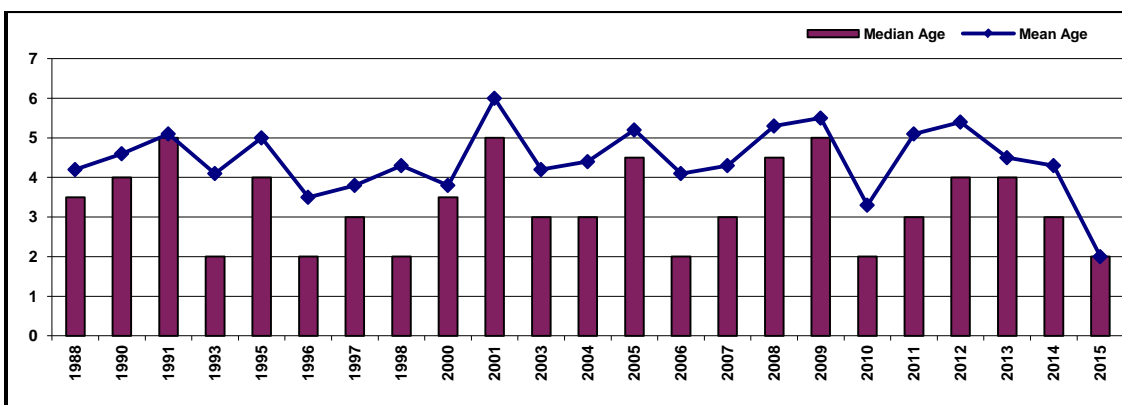


Figure 7. Median and mean age of harvested cow moose in Bighorn Herd Unit. Teeth aged by cementum analyses. Only female moose ≥ 1 year old included in analysis. There is no desired minimum threshold established for female moose age data.

Harvest Data

Hunters harvested an estimated 28 moose in 2015, a 48% decrease in harvest over 2014 and the lowest harvest since 1999. Harvest declined as a direct result of decreased license availability. We reduced Type 1 licenses by 10 and Type 4 licenses by 15, for a total license reduction of 42%.

Hunter success was 85% and effort, as measured by days hunted per moose harvested, was 10.6 days/harvest. Success improved slightly in 2015, but is at the lower limit of the desired level (i.e. 85%+). Hunter success was lowest again in Area 34, with only 79% of hunters successful. Effort decreased slightly in 2015 but was still significantly higher than recent years.

These parameters suggest moose were somewhat difficult to find during the 2015 season. This could be a function of population declines as well as warm and dry hunting conditions. We have reduced this population through harvest over the past decade. Moose along major roads, where they are readily visible and relatively easy to hunt, have been reduced the most. Willows lost their leaves in early September in 2015, prior to the hunting season. Once willow leaves turn color and begin to drop, they become unpalatable to moose and moose move to other habitat types, where they are often harder to locate and are less vulnerable to harvest.

Since moose licenses are often a once-in-a-lifetime opportunity, especially in this herd unit, we try to balance license allocation with moose numbers to assure high (i.e. 85%+) success rates for license holders.

Most hunters checked in the field seemed satisfied with their hunting experience in this herd unit. Comments submitted with the harvest survey were highly variable and suggested some hunters were satisfied while others were disappointed with their hunting experience.

Population

Due to difficulty obtaining meaningful vital rate data and limitations of population estimation for moose herds at this time, we have moved away from a post-season population management objective and have adopted a Trend Count management objective, with age-based secondary harvest objectives. Trend Counts give us a known minimum population at a specific point in time.

In Hunt Area 1, we have classification / trend counts going back to 1970s. Aerial helicopter surveys were initiated in 1992 and have been flown every year since 1994. Surveys are conducted pre-season in this hunt area in habitats where moose are most visible. The sub-objective for this hunt area is 50 moose (± 10). In 2015, we observed 58 moose, the highest count in 4 years. The 3-year running average is 43 moose.

In Hunt Area 34, we have survey counts going back into the mid-1990s. We initiated aerial surveys in 2001. This area is surveyed post season each year in habitats where moose are most visible. The sub-objective for this hunt area is 30 moose (± 6). In 2015, we observed only 24 moose, the lowest count since 1994, and third year in a row of declining counts. The 3-year running average is 30 moose. Management the past several years was designed to reduce this segment of the population due to moose numbers being higher than the population sub-objective. Willow and aspen habitats are generally in poor condition with heavy browsing in this hunt area.

Moose surveys have been sporadic in Hunt Area 42 over the years, with the last significant effort conducted in 2006. Efforts were initiated in 2015 to establish designated mid-summer ground survey routes in this hunt area. The sub-objective for this hunt area is 30 moose (± 6). The initial survey resulted in 38 moose observed. There is no 3-year running average due to lack of survey data the prior two years.

Overall, we observed 120 moose during 2015 classification / trend count surveys, compared to our management objective of 110 moose (± 22). The 3-year running average is 85 moose, but doesn't have any count data from Hunt Area 42 for 2013 and 2014.

Management Summary

Moose licenses are limited quota in all hunt areas. The Bighorn Herd Unit is very popular based on the number of applications for licenses available. The regular hunting season runs October 1 – 31 in all hunt areas, with an archery pre-season from September 15 – 30. Archers often harvest up to 50% of the bulls in any given year. Most moose hunting in this herd unit is on the Bighorn National Forest with good access for hunters. Snow can limit access into some areas as the season progresses.

We are concerned we may have lowered this population more than desired. Moose no longer use some areas where they were common just 5-10 years ago. Reports of fewer moose, from both hunters and general wildlife viewers, have increased in recent years. Classification counts in 2015 improved in Area 1 but continued to decline in Area 34. We are at or near desired male harvest indices, suggesting we may be close to harvesting more males than is desired. This could result in a decrease in bull quality over time, contrary to the special management objective of providing trophy quality opportunities. This could also influence pregnancy rates if there are not sufficient males (60+ males:100 cows) to breed receptive females. We reduced Type 1 (any moose) licenses for the 2015 season and recommend maintaining that level for the 2016 season. We recommend reducing Area 34, Type 4 licenses by 5 in response to continued decline in survey counts.

We estimate a harvest of 24 moose in 2016, a decrease from recent years. This should keep the population near the current level. Wyoming Governor's Complimentary moose licenses are only valid in hunt areas with >10 any or antlered moose (i.e. Type 1) licenses. As such, they are no longer valid in any hunt area in this herd unit.

This herd unit provides quality wildlife viewing opportunities, with moose visible from U.S. Highways 14, 14A and 16, as well as main forest service roads, throughout the spring and summer.

Moose habitats, especially riparian and aspen communities, remain a concern on the Bighorn Mountains due to their relatively poor condition and heavy browsing pressure. We will continue to work with the Bighorn National Forest to address these concerns.

Table 1. Moose classification/trend count in Hunt Area 42 by survey route. This survey was conducted in late June, 2015.

2015 Moose Survey Hunt Area 42									
Warden District	Route / Area	Observer	Adult Male	Yearling Male	Adult Female	Yearling Female	Juvenile	Unclassified	# Total
Ten Sleep	West Tensleep Creek	T. DeSomber			2		2		4
Ten Sleep	Willow Creek	T. DeSomber			1		1		2
Ten Sleep	Canyon Creek	D. Smith							0
Ten Sleep	Meadowlark Lake	D. Smith							0
Worland	Woodchuck Bench to Freezeout Point	M. Lentsch			4				4
Worland	Middle Paintrock Loop	M. Lentsch			1			1	2
Greybull	Granite Creek	B. Robertson		1	2		1		5
Greybull	Shell Creek	B. Robertson	1		1	2	1		5
Greybull	Forest Service Road 17	L. Schreiber	2		3	2			7
Greybull	Med Lodge/Paintrock Lakes	L. Schreiber	3		1	1			5
Lovell	Five Springs	J. Hobbs							0
Lovell	Hwy 14 to Bald Mountain	J. Hobbs							0
Lovell	Porcupine Ranger Station to Bucking Mule Falls	J. Hobbs			3		1		4
TOTAL:			6	1	18	6	6	1	38

