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2013 - JCR Evaluation Form

Species: Mule Deer

Period: 6/1/2013 - 5/31/2014

Herd: MD101 - TARGHEE

Hunt Areas: 149, 900

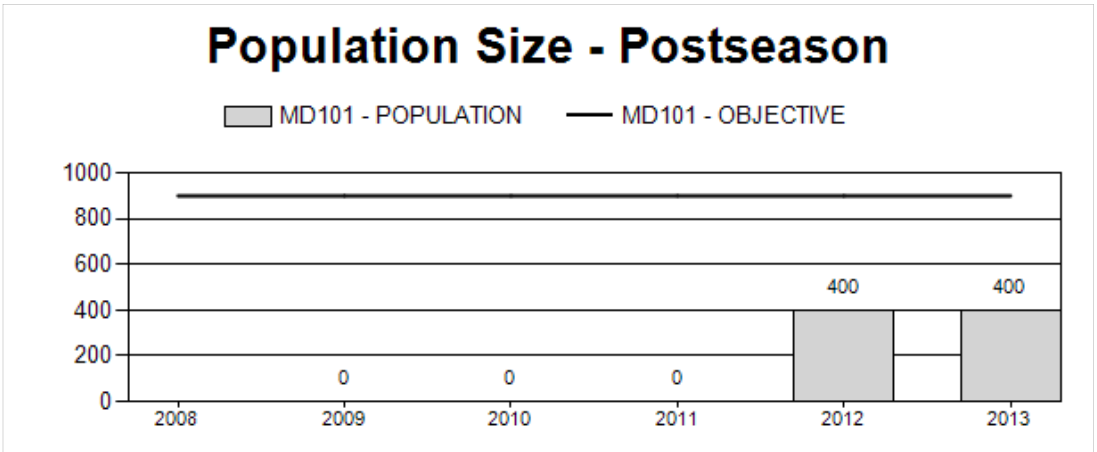
Prepared By: ALYSON COURTEMANCH

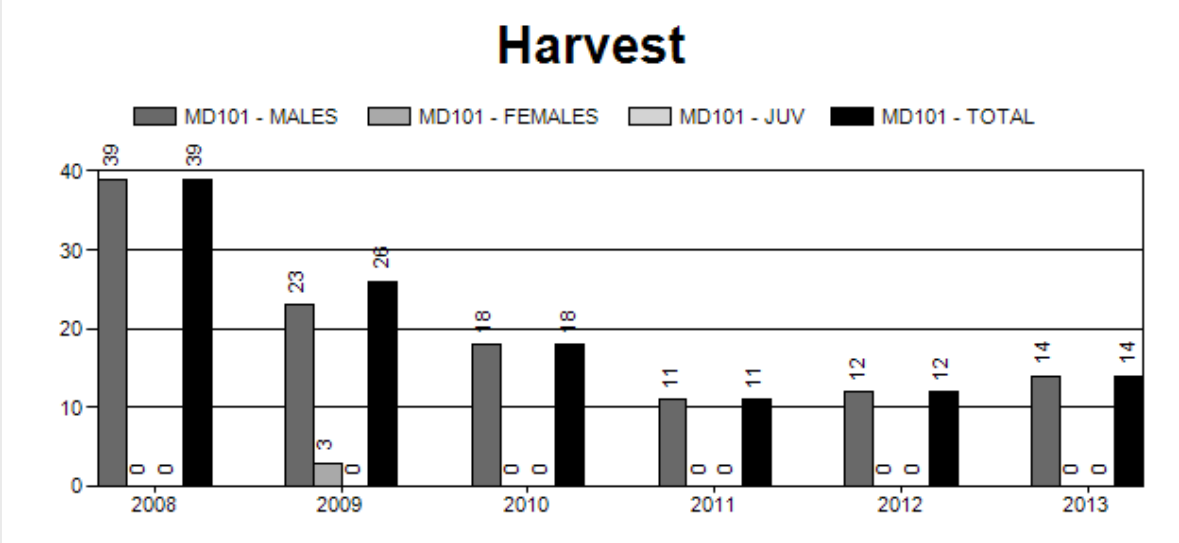
	2008 - 2012 Average	2013	2014 Proposed
Population:	80	400	400
Harvest:	21	14	15
Hunters:	122	73	70
Hunter Success:	17%	19%	21 %
Active Licenses:	122	73	70
Active License Percent:	17%	19%	21 %
Recreation Days:	760	348	360
Days Per Animal:	36.2	24.9	24
Males per 100 Females	0	0	
Juveniles per 100 Females	0	0	

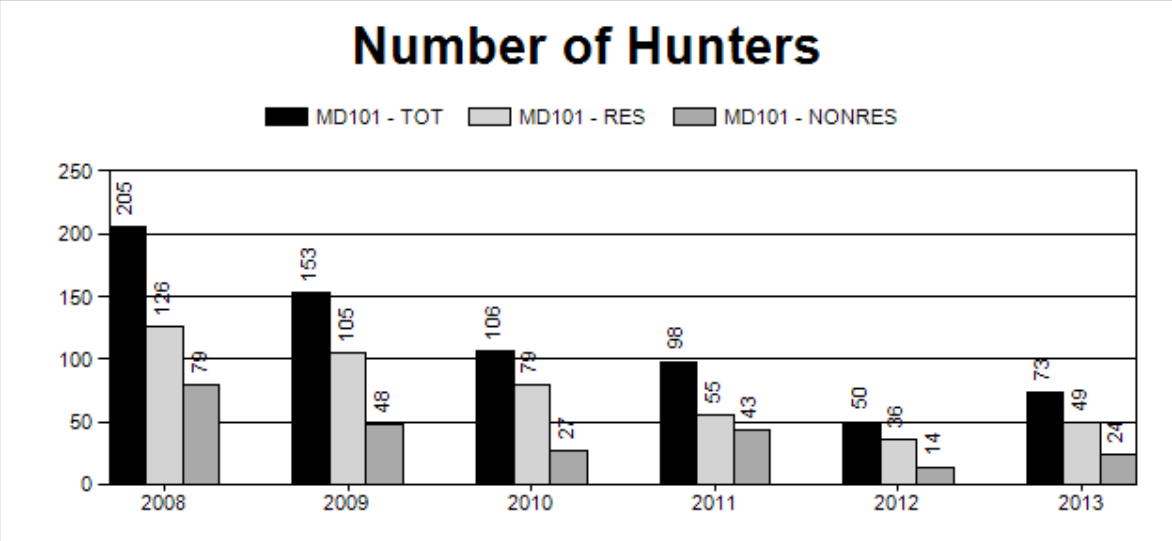
Population Objective:	900
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-55.6%
Number of years population has been + or - objective in recent trend:	0
Model Date:	None

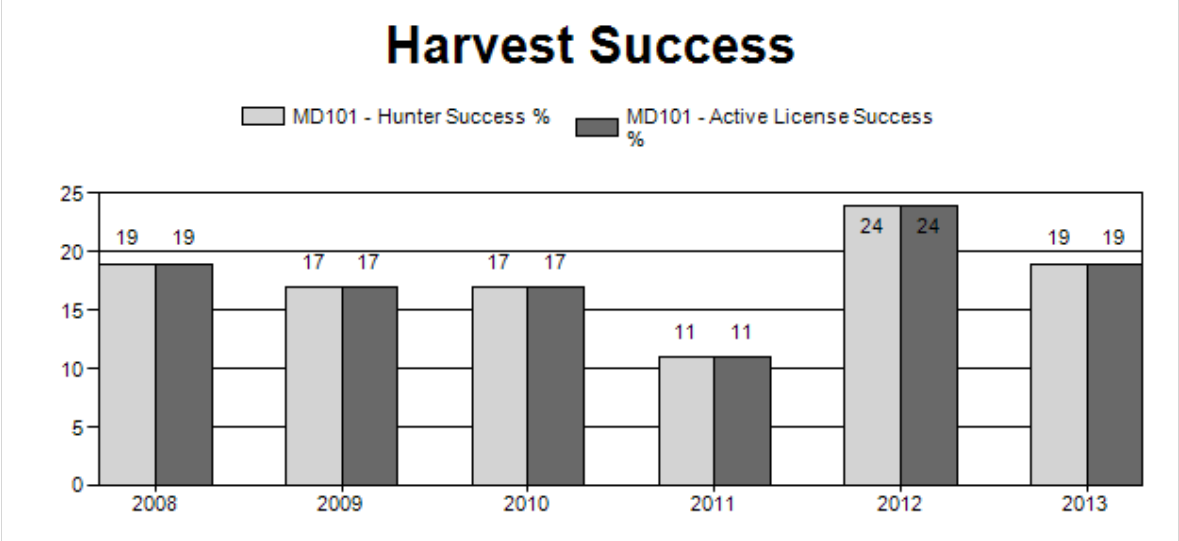
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

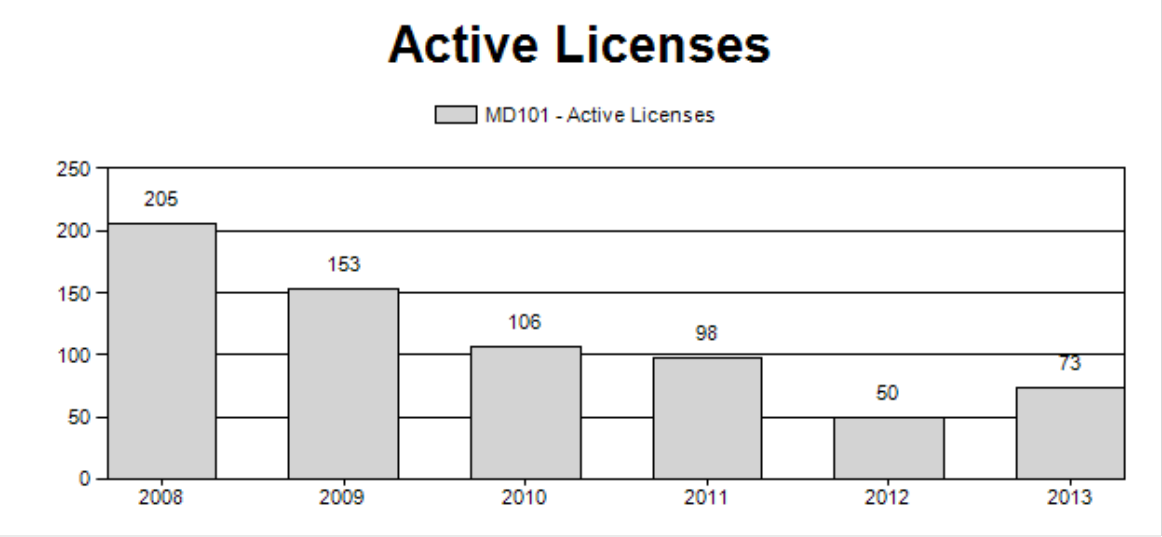
	JCR Year	Proposed
Females ≥ 1 year old:	na%	na%
Males ≥ 1 year old:	na%	na%
Juveniles (< 1 year old):	na%	na%
Total:	na%	na%
Proposed change in post-season population:	na%	na%

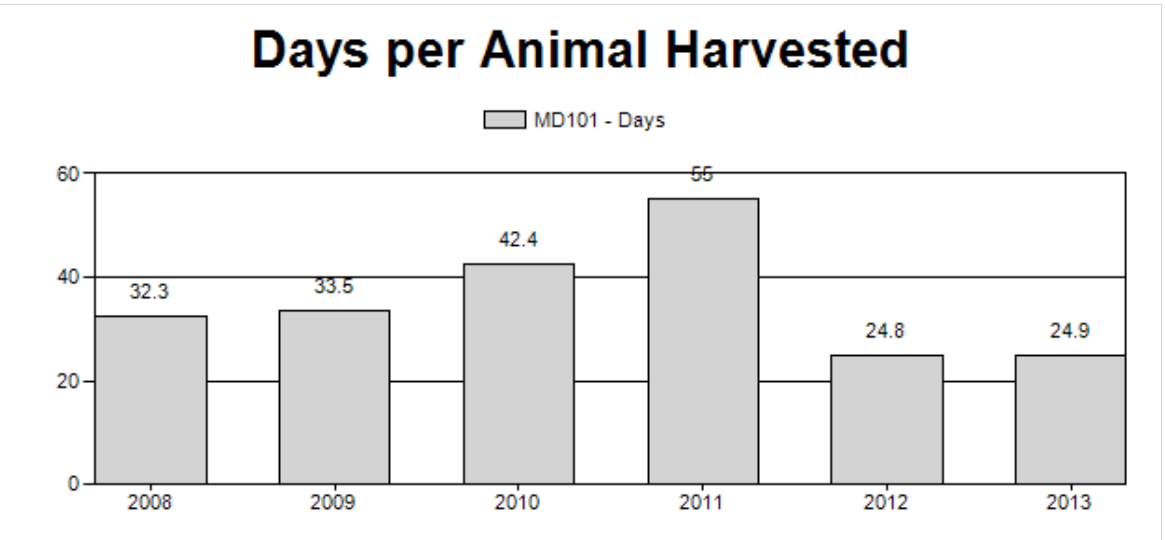


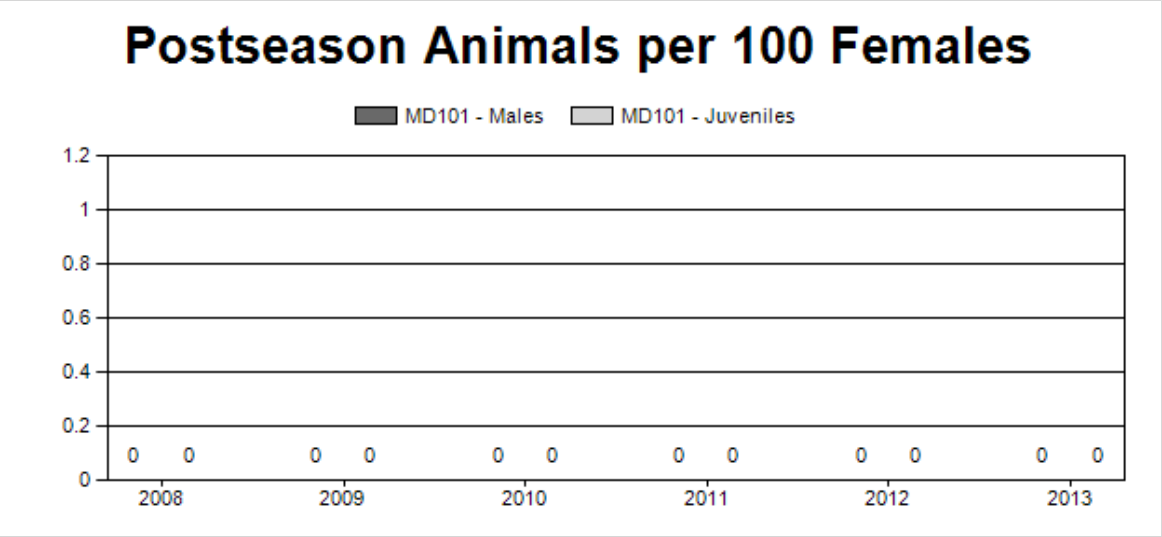

Harvest
MD101 - MALES
MD101 - FEMALES
MD101 - JUV
MD101 - TOTAL
40
30
20
10
0
39 0 0 39
23 3 0 26
18 0 0 18
11 0 0 11
12 0 0 12
14 0 0 14
2008
2009
2010
2011
2012
2013


Number of Hunters
MD101 - TOT
MD101 - RES
MD101 - NONRES
250
200
150
100
50
0
205 126 79
153 105 48
106 79 27
98 55 43
50 36 14
73 49 24
2008
2009
2010
2011
2012
2013


Harvest Success
MD101 - Hunter Success %
MD101 - Active License Success %
25
20
15
10
5
0
19 19
17 17
17 17
11 11
24 24
19 19
2008
2009
2010
2011
2012
2013


Active Licenses
MD101 - Active Licenses
250
200
150
100
50
0
205
153
106
98
50
73
2008
2009
2010
2011
2012
2013


Days per Animal Harvested
MD101 - Days
60
40
20
0
32.3
33.5
42.4
55
24.8
24.9
2008
2009
2010
2011
2012
2013


Postseason Animals per 100 Females
MD101 - Males
MD101 - Juveniles
1.2
1
0.8
0.6
0.4
0.2
0
0 0
0 0
0 0
0 0
0 0
0 0
2008
2009
2010
2011
2012
2013

2008 - 2013 Postseason Classification Summary

for Mule Deer Herd MD101 - TARGHEE

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2009	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2010	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2011	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2012	400	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2013	400	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0

2014 HUNTING SEASONS
TARGHEE MULE DEER HERD (MD101)

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
149		Sep. 15	Oct. 7		General	Antlered mule deer or any white-tailed deer

Special Archery Seasons

Hunt Area	Dates of Seasons	
	Opens	Closes
149	Sep. 1	Sep. 14

Summary of Changes for 2014

Area	Type	Change from 2013
149		+1 day

<u>Management Evaluation</u>
Current Postseason Population Management Objective: 900
Management Strategy: Recreational
2013 Postseason Population Estimate: ~400
2014 Proposed Postseason Population Estimate: ~400

The management objective for the Targhee deer herd is 900 deer. The management strategy for this herd is designated as Recreational Management. Spreadsheet models developed for this herd do not appear to adequately simulate observed trends. Managers will develop an alternative proposal for the herd unit objective in 2014.

Herd Unit Issues

This population is likely below the post season management objective based on field observations along the Wyoming-Idaho State line and harvest statistics. Mule deer in this population spend summer and early fall in Wyoming and winter along drainages in Idaho. Late season hunts in Idaho and residential development restrain this population. Post-season classification surveys are not flown in this herd due to budget constraints. More restrictive hunting seasons have been implemented to allow this population to increase.

Weather

Following an extremely dry summer and fall in 2012, weather conditions in 2013 were considerably wetter. The area received significant pulses of spring and fall moisture, which improved forage conditions for mule deer and other ungulates. Winter precipitation was reported at 109% of normal by mid-February 2014. Please refer to the following web sites for specific weather station data. **http://www.ncdc.noaa.gov/temp-and-precip/time-series** and **http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html**

Habitat

No habitat data has been collected on mule deer summer and winter ranges in recent years. There are several historical vegetation transects that have not been monitored in the past 5 years. Several habitat improvement projects are being implemented in this herd unit, including the Hill Creek Prescribed Burn, which is scheduled for completion in 2014. In addition, a habitat treatment in Teton Canyon is currently in the planning stages to improve mountain shrub and aspen communities for mule deer. Please refer to the 2013 Annual Report Strategic Habitat Plan Accomplishments for Jackson Region habitat improvement project summaries (**http://wgfd.wyo.gov/web2011/wildlife-1000708.aspx**).

Field Data

No field data were collected in the Targhee Herd Unit during the 2013 biological year.

Harvest Data

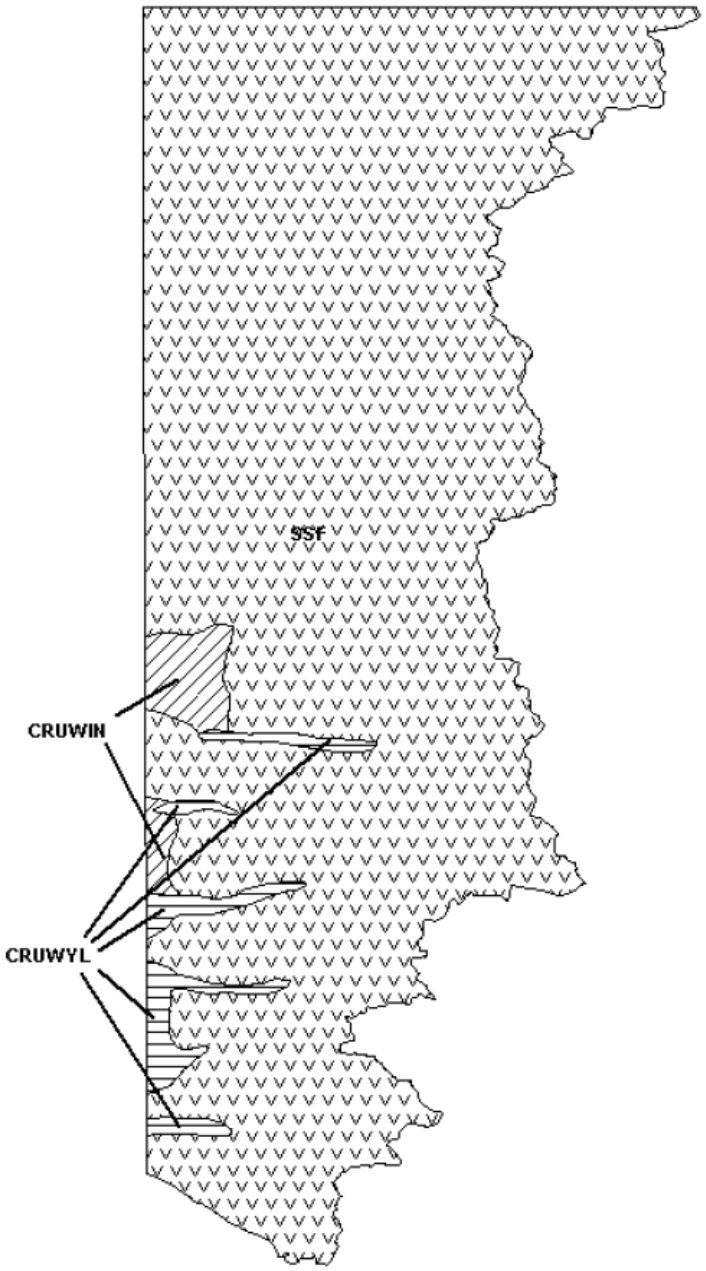
Based on harvest statistics, the density of mule deer in the Targhee Herd continues to be a concern. In 2013, there were 73 active hunters but only 19% harvest success. The average days to harvest was 25. The overall number of mule deer harvested is one of the lowest harvests reported on the west side of the Teton Range since 1983. The number of hunters peaked in 1983 when 575 hunters participated in this hunt.

Population

This population likely declined following liberal hunting seasons in Idaho. Data are limited for this population and spreadsheet models do not simulate observed trends.

Management Summary

Due to the “interstate” nature of this population, managing this herd is difficult. Observations of deer along the state line indicate this population remains at a low density even though hunting seasons are conservative. There are no changes to the hunting season for 2014. Antlered deer seasons will close on October 7 to coincide with hunt season closures in adjacent hunt areas east of Jackson. Hunting seasons in Area 149 have minimal impact on this herd and it is likely that more harvest occurs in Idaho than Wyoming.



Mule Deer (MD101) - Targhee
HA 149
Revised - 7/87

2013 - JCR Evaluation Form

SPECIES: Mule Deer | PERIOD: 6/1/2013 - 5/31/2014

HERD: MD131 - WYOMING RANGE

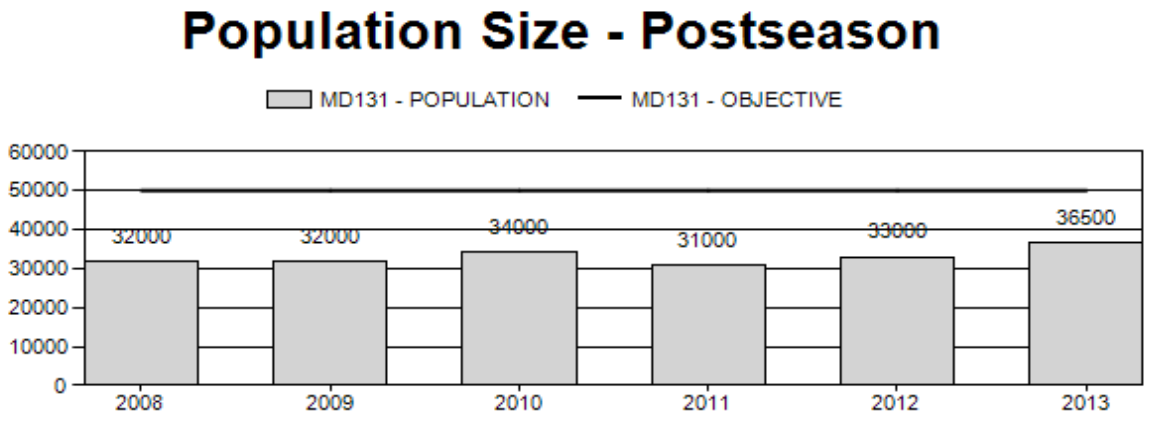
HUNT AREAS: 134-135, 143-145 | PREPARED BY: GARY FRALICK

	2008 - 2012 Average	2013	2014 Proposed
Population:	32,400	36,500	37,200
Harvest:	2,154	2,336	2,360
Hunters:	5,358	5,499	5,600
Hunter Success:	40%	42%	42 %
Active Licenses:	5,358	5,499	5,600
Active License Percent:	40%	42%	42 %
Recreation Days:	29,540	28,883	31,000
Days Per Animal:	13.7	12.4	13.1
Males per 100 Females	35	42	
Juveniles per 100 Females	62	70	

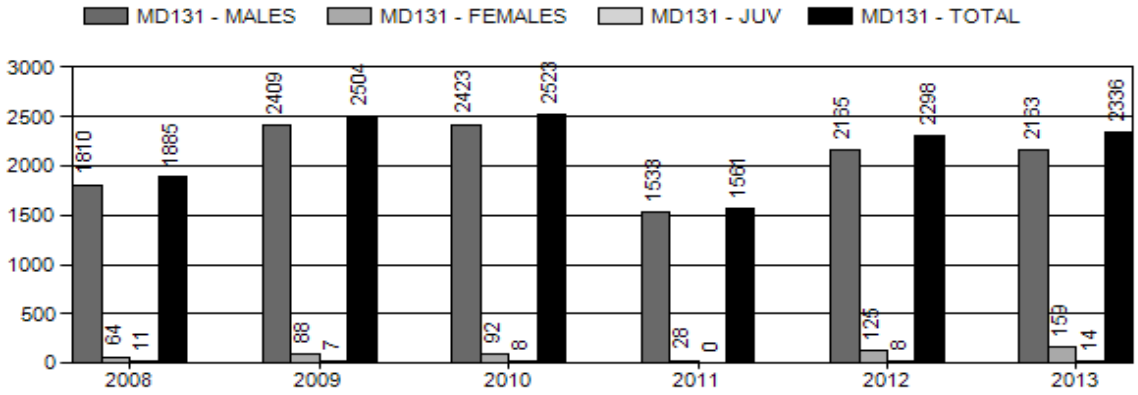
Population Objective:	50,000
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-27%
Number of years population has been + or - objective in recent trend:	21
Model Date:	02/23/2014

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

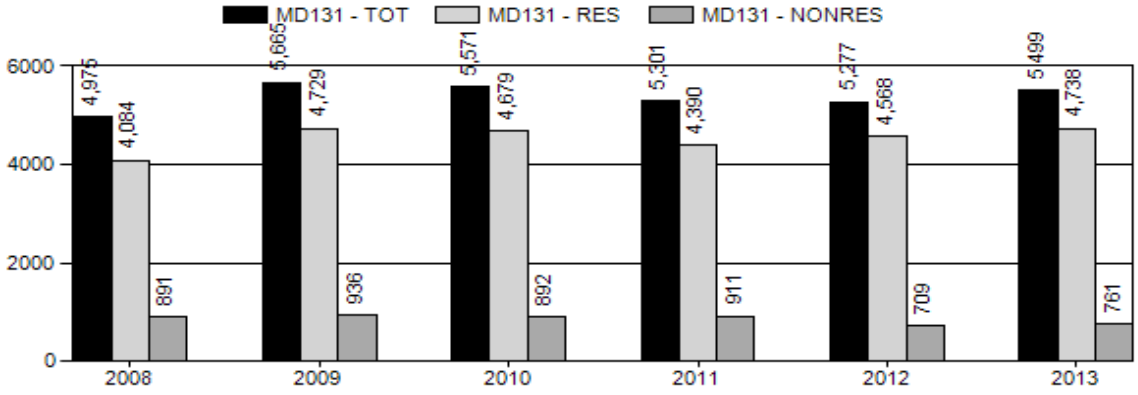
	JCR Year	Proposed
Females ≥ 1 year old:	1%	8%
Males ≥ 1 year old:	27%	25%
Juveniles (< 1 year old):	1%	2%
Total:	6%	6%
Proposed change in post-season population:	10%	2%



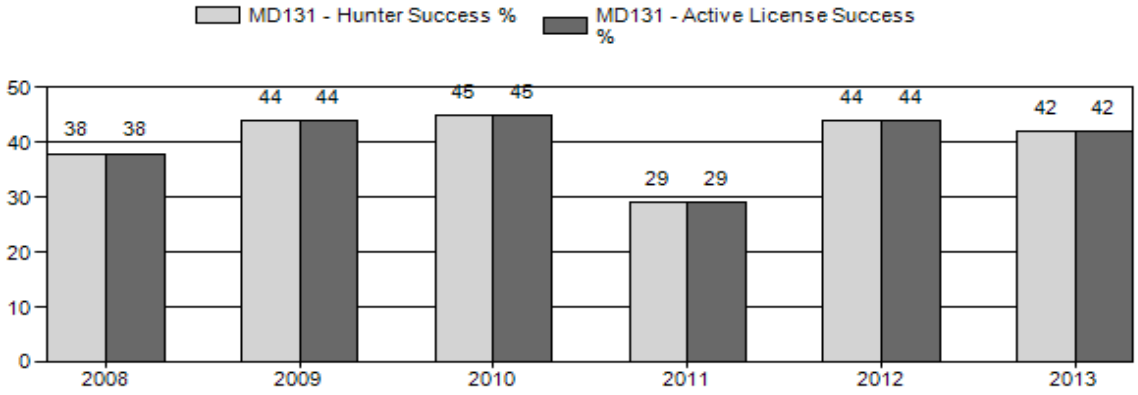
Harvest



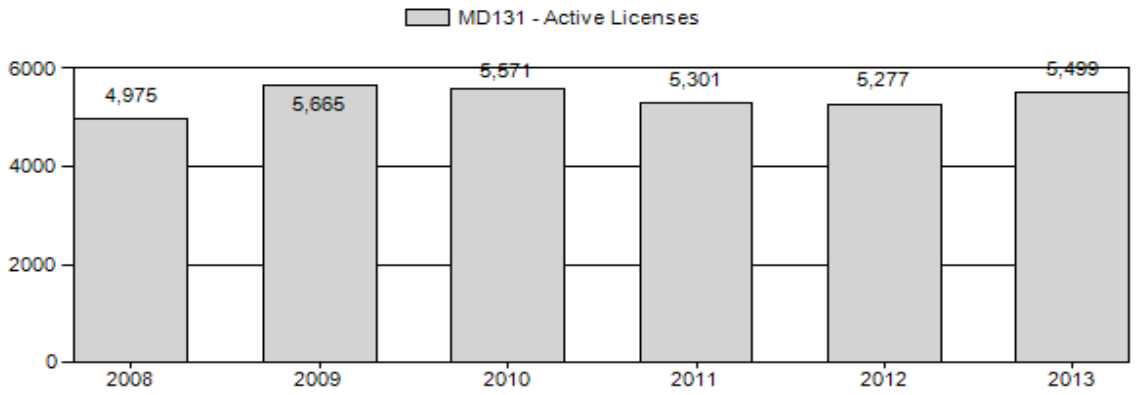
Number of Hunters



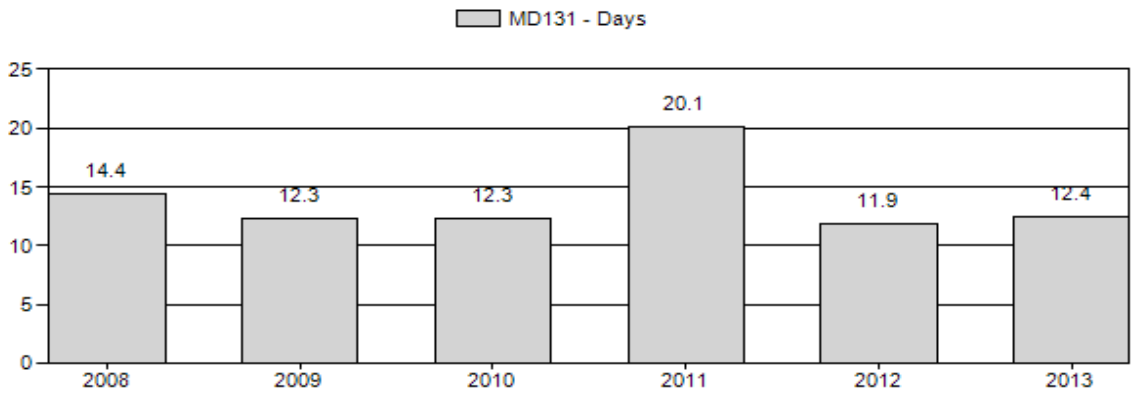
Harvest Success



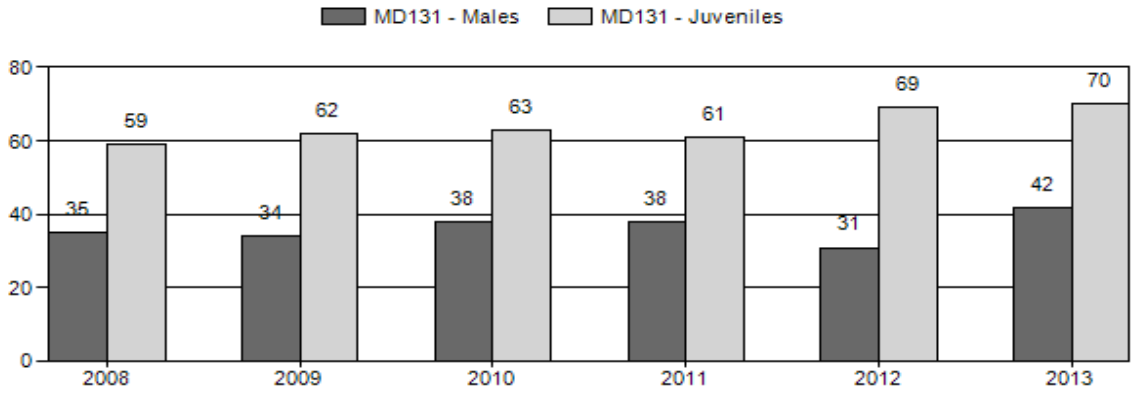
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Mule Deer Herd MD131 - WYOMING RANGE

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	32,000	494	693	1,187	18%	3,370	51%	2,004	31%	6,561	1,148	15	21	35	± 1	59	± 2	44
2009	32,000	466	760	1,226	17%	3,617	51%	2,249	32%	7,092	1,240	13	21	34	± 1	62	± 2	46
2010	34,000	494	688	1,182	19%	3,124	50%	1,960	31%	6,266	0	16	22	38	± 1	63	± 2	46
2011	31,000	340	998	1,338	19%	3,563	50%	2,173	31%	7,074	1,224	10	28	38	± 1	61	± 2	44
2012	33,000	251	439	690	15%	2,256	50%	1,556	35%	4,502	0	11	19	31	± 2	69	± 3	53
2013	36,500	544	704	1,248	20%	2,946	47%	2,065	33%	6,259	0	18	24	42	± 2	70	± 2	49

2014 HUNTING SEASON

SPECIES: MULE DEER HERD UNIT: WYOMING RANGE (MD131)

HUNT AREA	TYPE	OPENS	CLOSES	QUOTA	LIMITATIONS
134		Oct.1	Oct.14		General license; Antlered deer three (3) points or more on either antler
135		Oct. 1	Oct.14		General license; Antlered deer
143		Sep. 15	Oct. 7		General license; Antlered mule deer or any white-tailed deer
144		Sep. 15	Oct. 7		General license; Antlered mule deer or any white-tailed deer
145		Sep. 15	Oct. 7		General license; Antlered mule deer or any white-tailed deer

	8	Nov. 1	Jan. 31	60	Limited quota licenses; Doe or fawn white-tailed deer
134, 135		Sep. 1	Sep. 30		General license; Archery Only, Refer to Section 3
143, 144, 145		Sep. 1	Sep. 14		General license; Archery Only, Refer to Section 3

REGION G – NONRESIDENT LICENSE QUOTA – 600 LICENSES

SUMMARY OF CHANGES BY LICENSE NUMBER

Area	**Type**	**Change from 2013**
134	General	Change antlered deer to antlered deer 3-points or more on either antler
134, 135	General	Change closing dates from Oct. 11 to Oct. 14
134, 135	Youth	Eliminate Youth License Hunt
143, 144, 145	General	Add “antlered mule deer or any white-tailed deer”
143, 144, 145	General	Change closing dates from Oct. 6 to Oct. 7
145	Type 8	Increase in licenses from 35 to 60
Herd Unit Total	Type 8	+25 licenses

<u>Management Evaluation</u>
Current Postseason Population Management Objective: 50,000
Management Strategy: Special
2013 Postseason Population Estimate: ~36,500
2014 Proposed Postseason Population Estimate: ~37,200

The population objective for Wyoming Range mule deer herd is 50,000 deer. The management strategy is special and the objective and management strategy were last revised in 1994. The current population estimate is approximately 36,500 deer.

Herd Unit Issues

Management strategies since 1993 have emphasized hunting antlered deer in an effort to promote population growth. Antlered deer hunts occur in mid -September and early October throughout the herd unit. Hunt seasons close in the northern hunt areas prior to the onset of the annual fall migration in order to minimize vulnerability of bucks. Sustained population growth has been difficult because of the frequency of high overwinter mortality every 3 years on crucial winter ranges, and low vigor and productivity of important winter range browse.

The population objective for Wyoming Range mule deer herd is 50,000 deer. The management strategy is special management. The objective and management strategy were last revised in 1994. The current population estimate is approximately 36,500 deer. Management strategies since 1993 have emphasized the hunting of antlered deer in an effort to promote population growth. Antlered deer hunts occur in September and early October throughout the herd unit. Hunt seasons close in the northern hunt areas prior to the onset of the annual fall migration in order to minimize vulnerability of bucks during the migration.

Weather

Weather conditions during the 2013 were extremely dry during the early portion of the summer. By late summer the moisture regime had changed frequent precipitation scenario that persisted into the fall hunting season. Drought conditions in the early portion of the summer abated by late fall as persistent snow storms began to deposit snowpack in the Wyoming and Salt Mountain Ranges. By late winter 2014 snowpack in western Wyoming watersheds were estimated to be well-above normal. For additional weather and precipitation data please visit the following websites: http://www.ncdc.noaa.gov/temp-and-precip/time-series and http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html.

Habitat

Winter range browse plants have been measured each spring and fall to assess production and utilization since the late 1990s. Growing conditions improved in 2013 on winter ranges in spite of below average snowpack during the 2012-13 winter. Improved growing conditions were due to spring and summer rains which have a different effect on shrubs than winter snowpack due to rates of infiltration. Leader production on Wyoming big sagebrush and black sagebrush were the species most notably improved compared to the 2012 leader growth. However, average leader growth was still less than a half inch for Wyoming big sagebrush sites and less than two inches for mountain shrubs. For additional site specific information, please refer to the 2012 Annual Report Strategic Habitat Plan Accomplishments, pages104-123 for Pinedale Region habitat improvement project summaries (http://wgfd.wyo.gov/web2011/wildlife-1000708.aspx).

Field Data

The Wyoming Range deer herd has been unable to sustain population growth for more than 3 consecutive years since the early 1990s. Population growth has been severely compromised by moderate to severe winter mortality in 1992-93, 1996-97, 2001-02, 2003-04, 2004-05, 2005-06, 2007-08, and 2010-2011. Over-winter mortality has suppressed this population's ability to sustain growth because of poor survival and recruitment of fawns and yearlings during the last 21 years.

An on-going effort to monitor population dynamics with posthunt herd composition surveys provides an assessment of buck recruitment and fawn production and survival. Buck:doe ratios have met or exceeded the special management objective of 30-45 bucks:100 does in the posthunt population over the last 7 years. Moderate to high overwinter survival has ensured recruitment of 1.5+ year old bucks into the population.

The primary issue affecting the population dynamic of the northern segment of the herd, is the general decline in productivity and survival of fawns on the LaBarge/Big Piney winter ranges (Area 143) as seen in fawn:doe ratios from 1996- present. During the 5-year period from 1996-2000, an average of 82 fawns:100 does were observed on this winter range. During a subsequent 5-years period (2008-2012), the average fawn:100 does ratio was 62:100.

On the southern winter ranges, low fawn recruitment is of concern, and is believed to be related to habitat conditions. Poor browse production related to persistent drought, and an increase in decadent and over-mature forage plants on crucial winter ranges are factors that dictate over-winter deer survival even in mild and open winters. Additional factors are the declining trend in vigor, and increase in dead and decadence, of aspen communities in parturition and summer ranges. The condition of aspen communities is believed to be significant contributors to declining neonatal fawn survival and recruitment.

Over the last 21 years, posthunt herd composition surveys have been followed by post-winter change-in-ratio (CIR) surveys. These surveys provide a metric of over-winter survival of the juvenile cohort by comparing December to April changes in proportions of fawns. The effort to assess 2013-14 over-winter fawn mortality with CIR surveys resulted in a -26% change from December to April. The CIR results were complemented with annual post-winter mortality surveys that document age and sex class of individuals that perished on the winter ranges. This year participants surveyed approximately 140 miles of winter ranges and located 16 deer (10 fawns and 6 adults) that died during the current winter.

Harvest

Hunting seasons since 1993 have been designed to allow 7-14 days of hunting in the southern areas (Areas 134,135) and 16-23 days of hunting in the northern areas (Areas 143-145). Antlered only hunting, and the near absence of antlerless harvest has failed to produce the sustained population increase since the late 1990s. Nonresident licenses were reduced to 600 for Region G in 2012 and 2013 hunt seasons. Observed buck:doe ratios totaled 42 bucks :100 does

in 2013, which is the highest observed buck:doe ratio since 1991. A conservative management approach of closing hunting seasons prior to annual fall migration in the northern hunt areas has ensured that trophy class bucks continue to be recruited into the posthunt population.

Hunter success was estimated at 42% in 2013 with a total harvest of 2330 deer. Harvest success has exceeded 40% the last two years and reflects relatively high over-winter survival of all age and sex cohorts of the population, especially the 2+-years old male cohort. A total of 159 does and 14 fawns were taken in 2013; antlerless harvest tallied 7% of the total herd unit harvest. Antlered deer harvest (n=2163 bucks) was noted to be similar to the number of bucks taken in 2012 (n=2165 bucks). Nonresident hunters comprised 14% of the herd unit's total hunters, and accounted for 17% of the total harvest. Since the reduction in nonresident G licenses in 2012, the percentage of antlered deer checked in the field by Department personnel has increased for resident hunters.

Population

The population trend is increasing for this deer herd, although only minimally. The "Time Sensitive Juvenile – Constant Adult Mortality Rate" (TSJ,CA) spreadsheet model was used to derive the post season population estimate. The TSJ,CA model showed the best overall fit compared to the suite of available models (Fit=6, Relative AICc=121). This model tracks observed buck:100 doe ratios extremely well.

Management Summary

The 2014 hunting season is designed to promote population growth, permit the take of antlerless deer by youth hunters, and retain bucks in the posthunt population by closing hunt seasons prior to the onset of the fall migration. Nonresident Region G licenses will remain at 600 licenses. The 2014 season in Hunt Area 134 and 135 allows 14 days of general season antlered deer hunting. This is an increase of 3 days from 2013. The three day increase in hunting opportunity will allow two weekends of hunting.

Hunt Areas 143-145 will close on October 7 in 2014, and offer hunters the opportunity to harvest antlered mule deer buck or any white-tailed deer. The 2014 closing date is one day longer than the October 6 ending date in 2013. The October portion of the hunting season in the northern areas will offer hunters the opportunity to pursue buck deer for an entire week, while ensuring that bucks will not be hunted when they are most vulnerable during the fall migration. In Area 145, a limited quota doe or fawn white-tailed deer hunt will allow hunters to take white-tailed deer in an area where chronic damages to stored crops on private property have been occurring.

The 2014 hunting seasons are projected to harvest approximately 2300 deer. The population should increase to approximately 37,000 deer following the 2014 hunting seasons.

INPUT	
Species:	Mule Deer
Biologist:	Gary Fralick
Herd Unit & No.:	Wyoming Range
Model date:	02/23/14

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	Constant Juvenile & Adult Survival	205	214	☐ CJ,CA Model	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	116	136	☐ SCJ,SCA M	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	6	121	☑ TSJ,CA Model	

Population Estimates from Top Model

Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population			Total	Predicted Posthunt Population			Total	Objective
	Field Est	Field SE		Juveniles	Total Males	Females		Juveniles	Total Males	Females		
1993				6437	4938	13754	25129	6391	3884	13126	23400	
1994				7805	5302	12785	25892	7805	3925	12785	24515	
1995				9555	6690	13865	30110	9555	5016	13865	28435	
1996				10538	6341	13506	30384	10538	4792	13506	28836	
1997				9253	5988	13044	28284	9253	4676	13044	26973	
1998				11029	7828	14603	33460	11029	5619	14603	31251	
1999				13101	9513	16788	39402	13101	6654	16788	36543	
2000				15121	10436	18641	44197	15081	7040	18328	40449	
2001				12161	9882	19022	41066	12118	6896	18747	37761	
2002				10932	8007	17604	36543	10895	5597	17149	33640	
2003				11775	7623	16976	36374	11707	5208	16664	33578	
2004				11065	6559	15835	33458	11006	4489	15395	30890	
2005				11010	6860	15690	33560	11010	5061	15660	31731	
2006				10965	7406	15989	34360	10965	5346	15989	32300	
2007				12560	9263	17881	39704	12560	6765	17881	37206	
2008				10074	7990	16991	35055	10062	5999	16920	32981	
2009				10794	8600	17444	36838	10786	5950	17347	34083	
2010				11803	9672	18900	40375	11794	7007	18799	37600	
2011				10854	8279	17827	36960	10854	6592	17797	35243	
2012				11352	7509	16581	35442	11343	5123	16446	32912	
2013				12447	8742	17911	39100	12432	6363	17736	36531	
2014				11370	9623	18832	39824	11353	7203	18733	37289	
2015												
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												

Survival and Initial Population Estimates

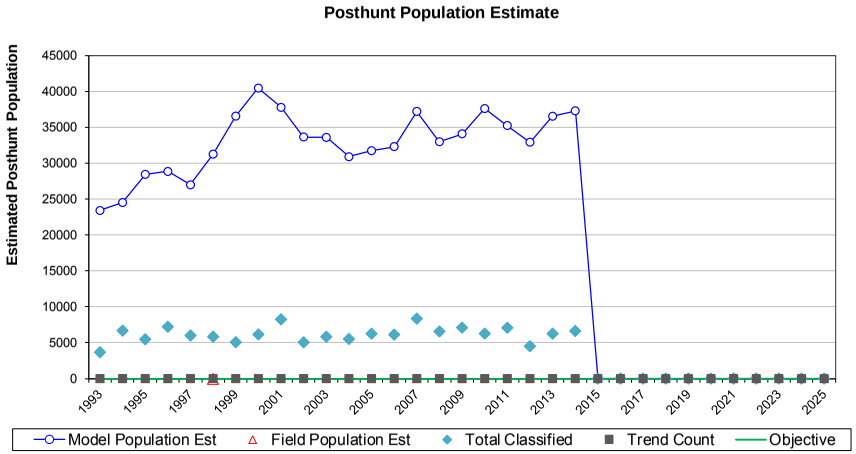
Year	Winter Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.67			0.81		
1994	0.90			0.81		
1995	0.48			0.81		
1996	0.40			0.81		
1997	0.87			0.81		
1998	0.90			0.81		
1999	0.77			0.81		
2000	0.55			0.81		
2001	0.40			0.81		
2002	0.57			0.81		
2003	0.40			0.81		
2004	0.59			0.81		
2005	0.60			0.81		
2006	0.90			0.81		
2007	0.40			0.81		
2008	0.74			0.81		
2009	0.90			0.81		
2010	0.44			0.81		
2011	0.40			0.81		
2012	0.81			0.81		
2013	0.72			0.81		
2014	0.00			0.81		
2015						
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

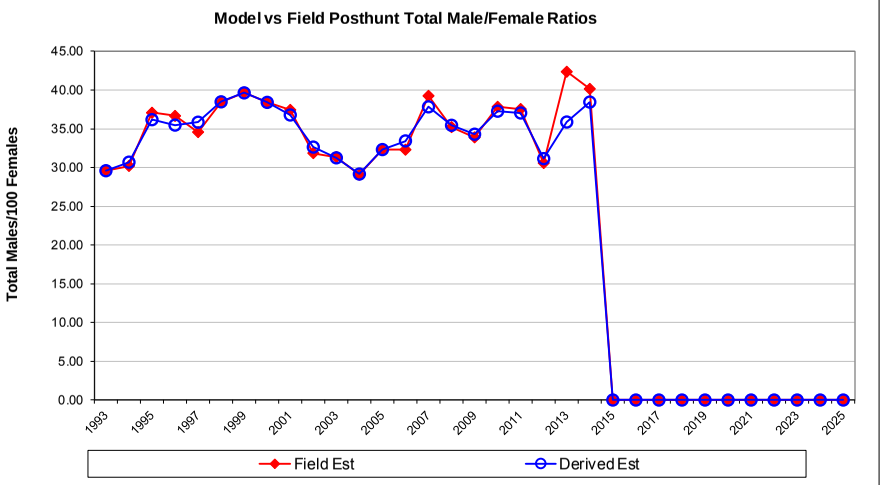
Parameters:	Optim cells
Adult Survival =	0.810
Initial Total Male Pop/10,000 =	0.388
Initial Female Pop/10,000 =	1.313

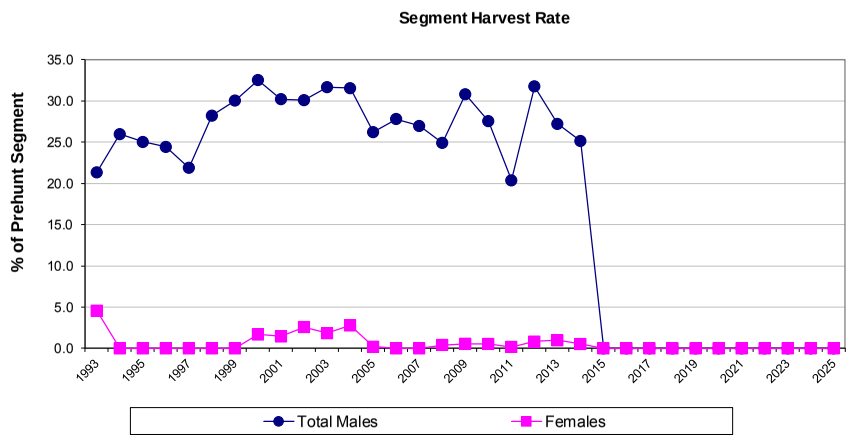
MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

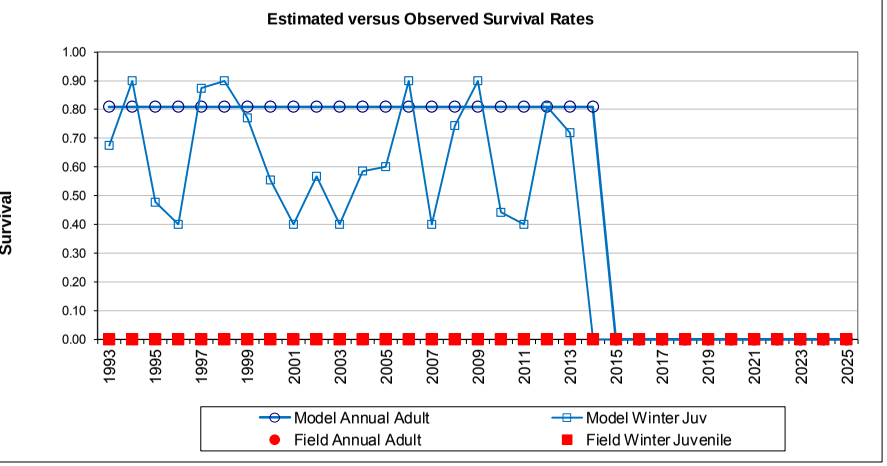
	Classification Counts						Harvest						
Year	Juvenile/Female Ratio			Total Male/Female Ratio								Segment Harvest Rate (% of Prehunt Segment)	
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Yrl males	2+ Males	Females	Total Harvest	Total Males	Females
1993		48.69	1.88	29.59	29.59	1.37	42	0	958	571	1571	21.3	4.6
1994		61.05	1.68	30.70	30.21	1.06	0	0	1252	0	1252	26.0	0.0
1995		68.91	2.09	36.18	37.07	1.38	0	0	1522	0	1522	25.0	0.0
1996		78.03	2.03	35.48	36.66	1.22	0	0	1408	0	1408	24.4	0.0
1997		70.94	2.04	35.85	34.58	1.26	0	0	1192	0	1192	21.9	0.0
1998		75.52	2.21	38.48	38.46	1.40	0	0	2008	0	2008	28.2	0.0
1999		78.04	2.44	39.64	39.66	1.54	0	0	2599	0	2599	30.1	0.0
2000		82.29	2.32	38.41	38.41	1.38	36	0	3087	285	3408	32.5	1.7
2001		64.64	1.61	36.78	37.44	1.12	39	0	2715	250	3004	30.2	1.4
2002		63.53	2.01	32.64	31.86	1.28	34	0	2191	414	2639	30.1	2.6
2003		70.25	2.03	31.25	31.34	1.19	62	0	2195	284	2541	31.7	1.8
2004		71.50	2.11	29.16	29.09	1.17	53	0	1881	400	2334	31.5	2.8
2005		70.30	1.97	32.32	32.32	1.18	0	0	1635	27	1662	26.2	0.2
2006		68.58	1.95	33.44	32.30	1.18	0	0	1873	0	1873	27.8	0.0
2007		70.24	1.73	37.83	39.25	1.17	0	0	2271	0	2271	27.0	0.0
2008		59.47	1.68	35.45	35.22	1.19	11	0	1810	64	1885	24.9	0.4
2009		62.18	1.67	34.30	33.90	1.12	7	0	2409	88	2504	30.8	0.6
2010		62.74	1.81	37.27	37.84	1.29	8	0	2423	92	2523	27.6	0.5
2011		60.99	1.66	37.04	37.55	1.20	0	0	1533	28	1561	20.4	0.2
2012		68.97	2.27	31.15	30.59	1.33	8	0	2169	123	2300	31.8	0.8
2013		70.10	2.01	35.88	42.36	1.43	14	0	2163	159	2336	27.2	1.0
2014		60.61	1.72	38.45	40.15	1.31	15	0	2200	149	2364	25.1	0.5
2015													
2016													
2017													
2018													
2019													
2020													
2021													
2022													
2023													
2024													
2025													

FIGURES









Comments:

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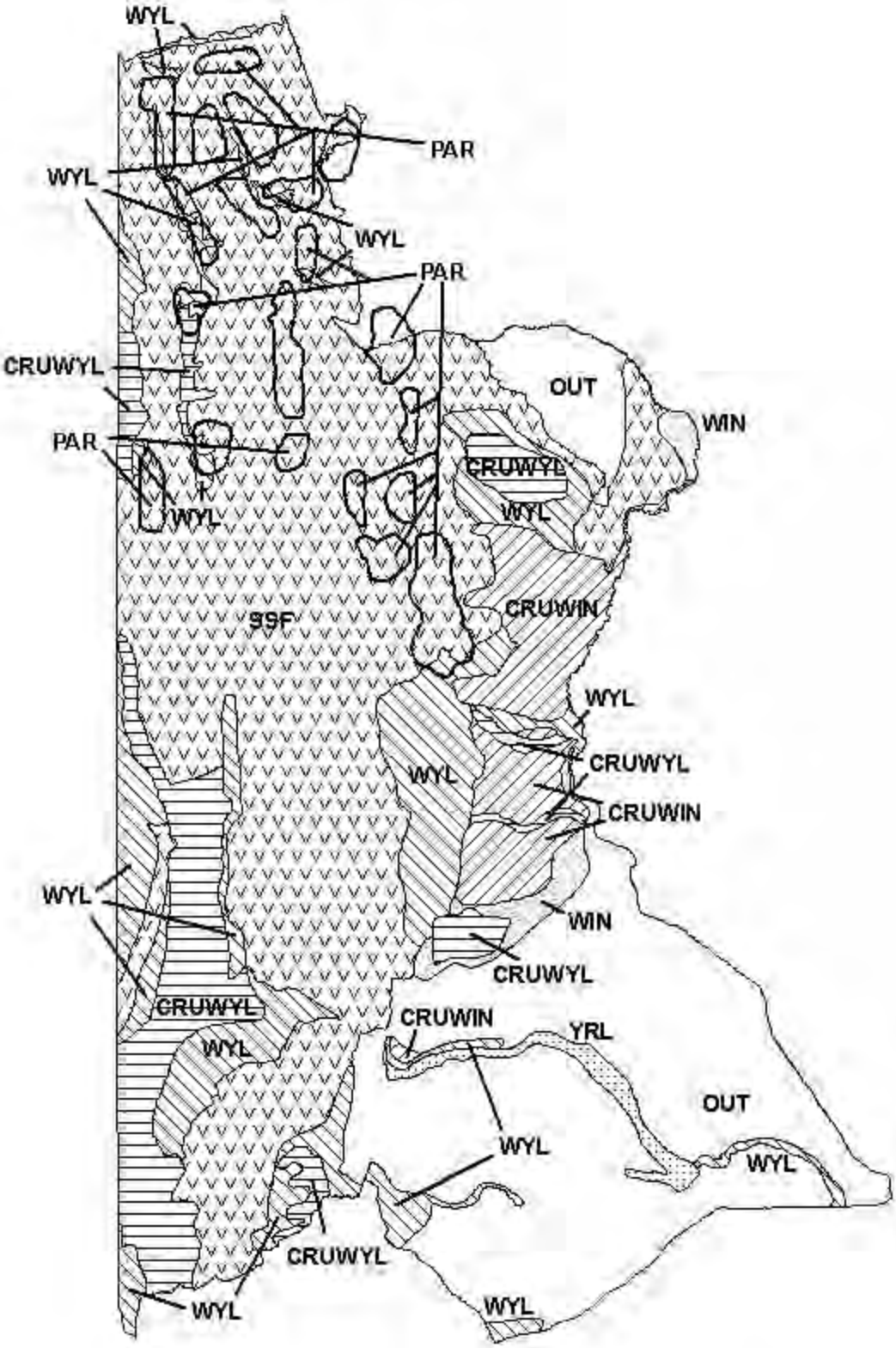


Mule Deer (MD131) - Wyoming Range
HA134, 135-137, 143-145, 147
Revised - 3/05

2013 - JCR Evaluation Form

SPECIES: Elk

PERIOD: 6/1/2013 - 5/31/2014

HERD: EL101 - TARGHEE

HUNT AREAS: 73, 900

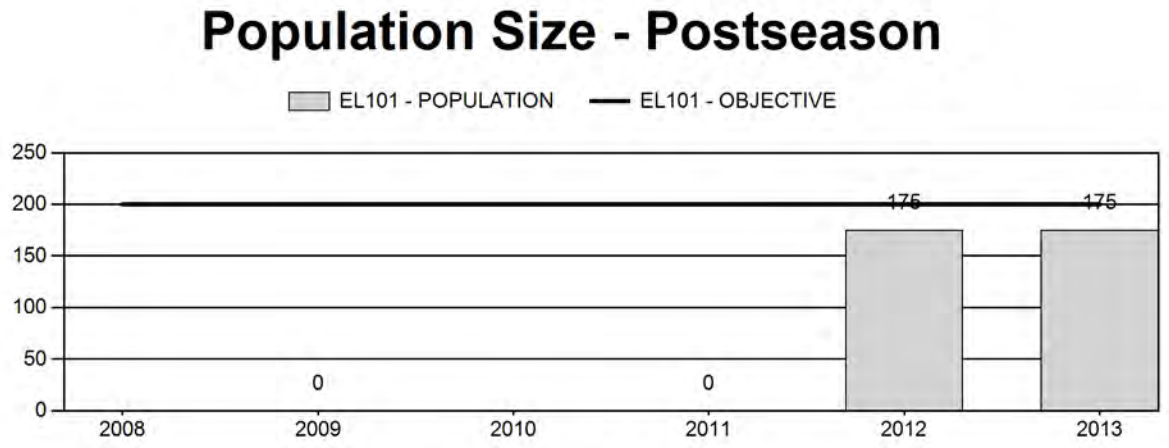
PREPARED BY: ALYSON COURTEMANCH

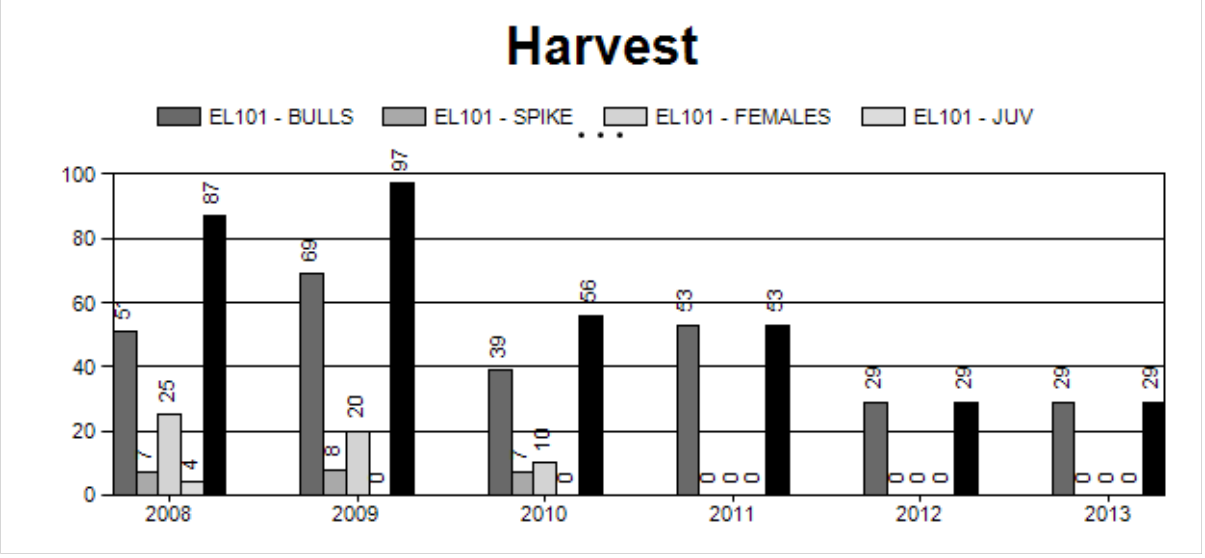
	2008 - 2012 Average	2013	2014 Proposed
Population:	35	175	175
Harvest:	64	29	30
Hunters:	204	100	115
Hunter Success:	31%	29%	26%
Active Licenses:	210	100	115
Active License Percent:	30%	29%	26%
Recreation Days:	1,360	563	575
Days Per Animal:	21.2	19.4	19.2
Males per 100 Females	0	0	
Juveniles per 100 Females	0	0	

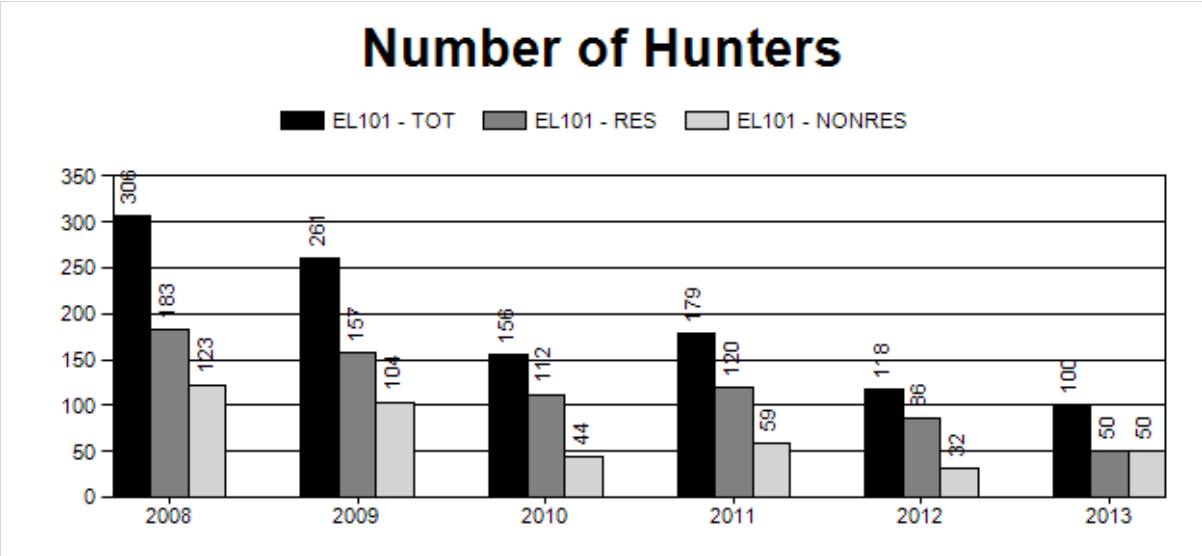
Population Objective:	200
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-12.5%
Number of years population has been + or - objective in recent trend:	0
Model Date:	None

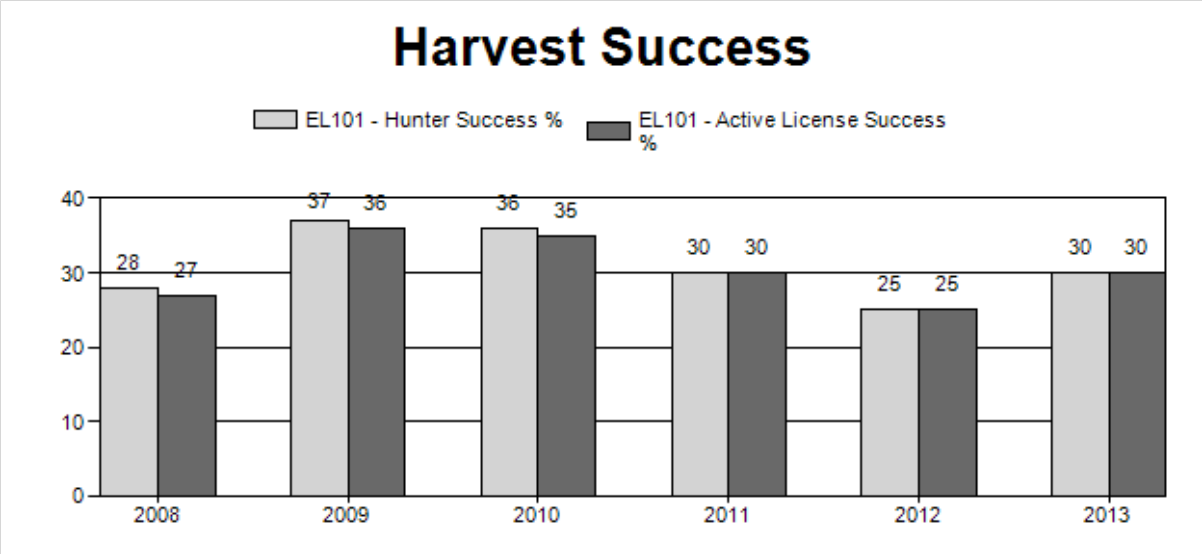
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

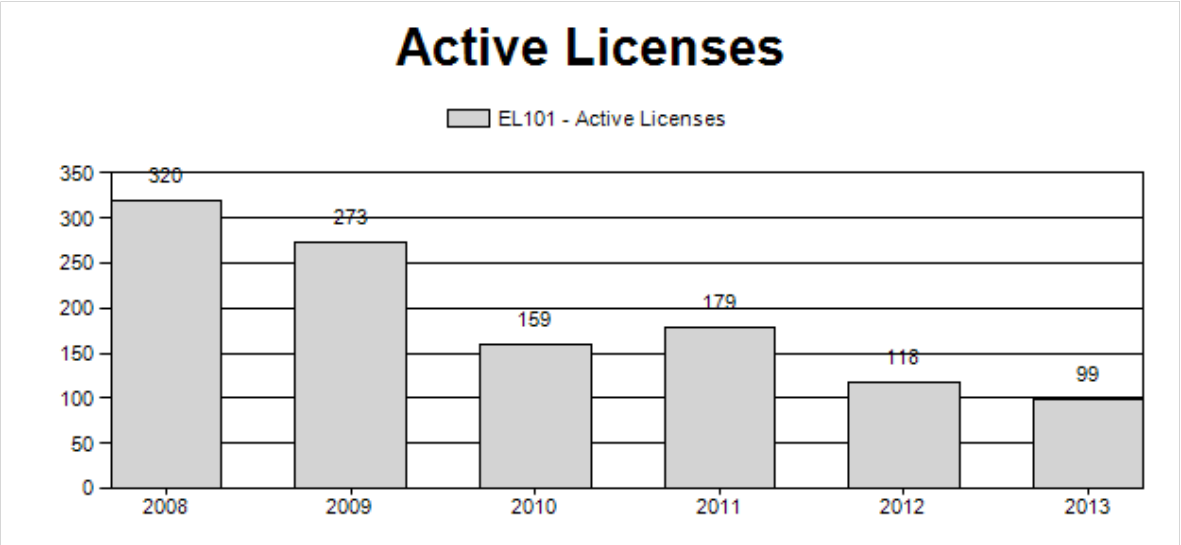
	JCR Year	Proposed
Females ≥ 1 year old:	na%	na%
Males ≥ 1 year old:	na%	na%
Juveniles (< 1 year old):	na%	na%
Total:	na%	na%
Proposed change in post-season population:	na%	na%

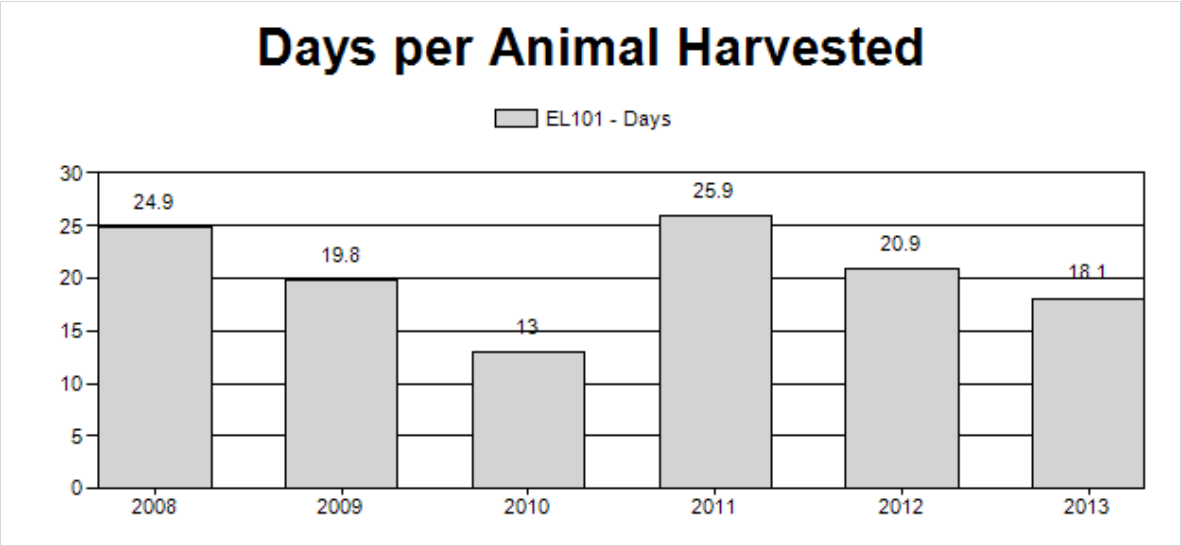


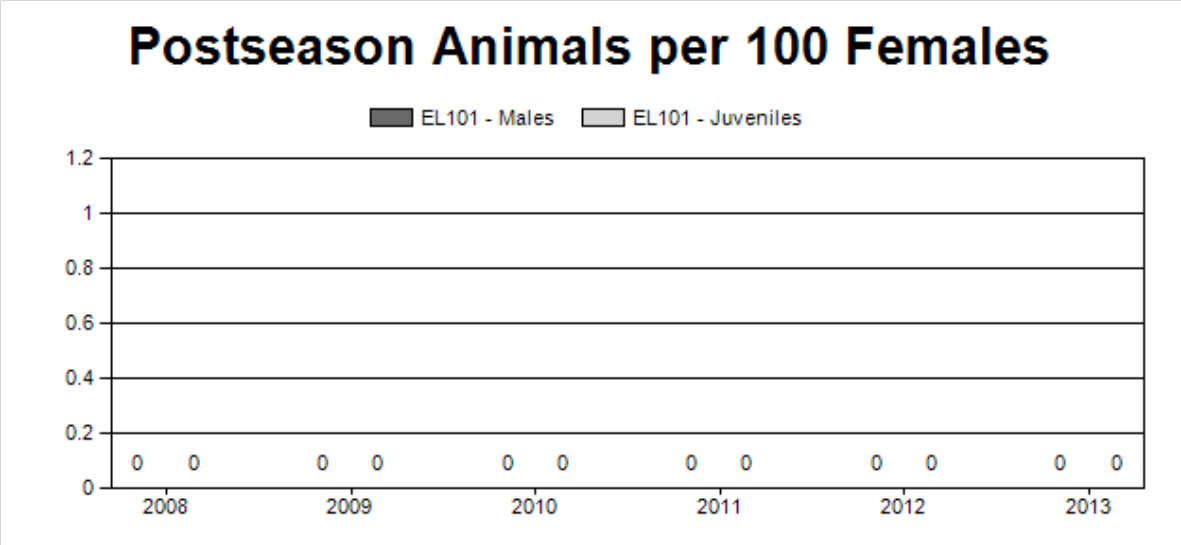

Harvest
EL101 - BULLS
EL101 - SPIKE
EL101 - FEMALES
EL101 - JUV
100
80
60
40
20
0
2008
2009
2010
2011
2012
2013


Number of Hunters
EL101 - TOT
EL101 - RES
EL101 - NONRES
350
300
250
200
150
100
50
0
2008
2009
2010
2011
2012
2013


Harvest Success
EL101 - Hunter Success %
EL101 - Active License Success %
40
30
20
10
0
28
27
37
36
36
35
30
30
25
25
30
30
2008
2009
2010
2011
2012
2013


Active Licenses
EL101 - Active Licenses
350
300
250
200
150
100
50
0
320
273
159
179
118
99
2008
2009
2010
2011
2012
2013


Days per Animal Harvested
EL101 - Days
30
25
20
15
10
5
0
24.9
19.8
13
25.9
20.9
18.1
2008
2009
2010
2011
2012
2013


Postseason Animals per 100 Females
EL101 - Males
EL101 - Juveniles
1.2
1
0.8
0.6
0.4
0.2
0
0 0
0 0
0 0
0 0
0 0
0 0
2008
2009
2010
2011
2012
2013

2008 - 2013 Postseason Classification Summary

for Elk Herd EL101 - TARGHEE

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2009	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2010	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2011	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2012	175	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2013	175	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	

2014 HUNTING SEASONS
TARGHEE ELK HERD (EL101)

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
73		Sep. 20	Oct. 25		General	Antlered elk, spikes excluded

Special Archery Seasons

Hunt Area	Dates of Seasons	
	Opens	Closes
73	Sep. 1	Sep. 19

Management Evaluation

Current Postseason Population Management Objective: 200
Management Strategy: Recreational
2013 Postseason Population Estimate: ~150
2014 Proposed Postseason Population Estimate: ~150

The management objective for the Targhee elk herd is 200 elk. Spreadsheet models developed for this herd do not appear to adequately simulate observed trends and therefore managers will develop an alternative objective proposal in 2014. The management strategy for this herd is designated as Recreational Management.

Herd Unit Issues

This population is likely below the post season management objective based on anecdotal observations along the Wyoming-Idaho State line and harvest statistics. Post-season classification surveys are not flown in this herd due to budget constraints. More restrictive hunting seasons have been implemented to allow this population to increase. The herd unit objective will be reviewed in 2014.

Weather

Following an extremely dry summer and fall in 2012, weather conditions in 2013 were considerably wetter. The area received significant pulses of spring and fall moisture, which improved forage conditions for elk and other big game. Winter precipitation was reported at 109% of normal by mid-February 2014. Please refer to the following web sites for specific weather station data. **http://www.ncdc.noaa.gov/temp-and-precip/time-series** and **http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html**

Habitat

No habitat data has been collected on elk seasonal ranges in recent years. There are several historical vegetation transects that have not been monitored in the past 5 years. Several habitat improvement projects are being implemented in this herd unit, including the Hill Creek Prescribed Burn, which is scheduled for completion in 2014. This project will improve aspen communities for elk and other ungulates. Please refer to the 2013 Annual Report Strategic Habitat Plan Accomplishments for Jackson Region habitat improvement project summaries **(http://wgfd.wyo.gov/web2011/wildlife-1000708.aspx)**.

Field Data

No field data were collected in the Targhee Herd Unit during the 2013 biological year.

Harvest Data

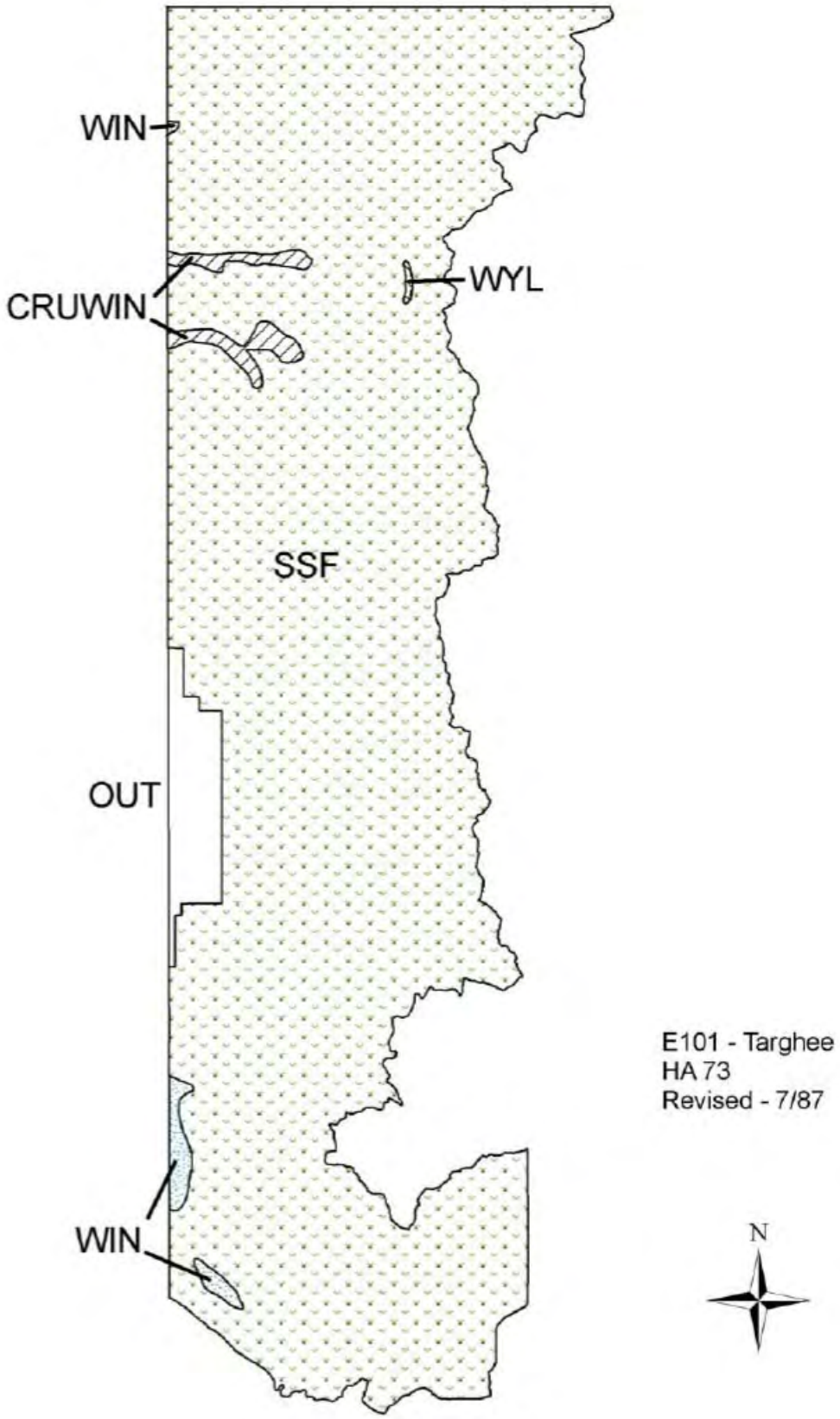
Based on harvest statistics, the density of elk in the Targhee Herd continues to be a concern. The overall number of elk harvested remained low in 2013 (n=29) as did the number of hunters (n=99). Antlerless elk seasons were eliminated in 2010 and the season was shortened 6 days in 2012.

Population

This population likely declined following liberal hunting seasons in Idaho. Data are limited in this population and spreadsheet models developed for this population do not simulate observed trends.

Management Summary

Due to the “interstate” nature of this population, managing this herd is difficult. This population spends the summer and early fall in Wyoming and winters along drainages in the foothills of the Teton Range. Observations of elk along the state line indicate this population remains at a low density even though hunting seasons are conservative. In an effort to improve recruitment in this population a spikes excluded season was implemented in 2013 and will continue in 2014. There will be no changes to hunting seasons in 2014.


WIN
CRUWIN
WYL
SSF
OUT
WIN
E101 - Targhee
HA 73
Revised - 7/87
N

2013 - JCR Evaluation Form

SPECIES: Elk

PERIOD: 6/1/2013 - 5/31/2014

HERD: EL102 - JACKSON

HUNT AREAS: 70-72, 75, 77-83, 777, 888, 899

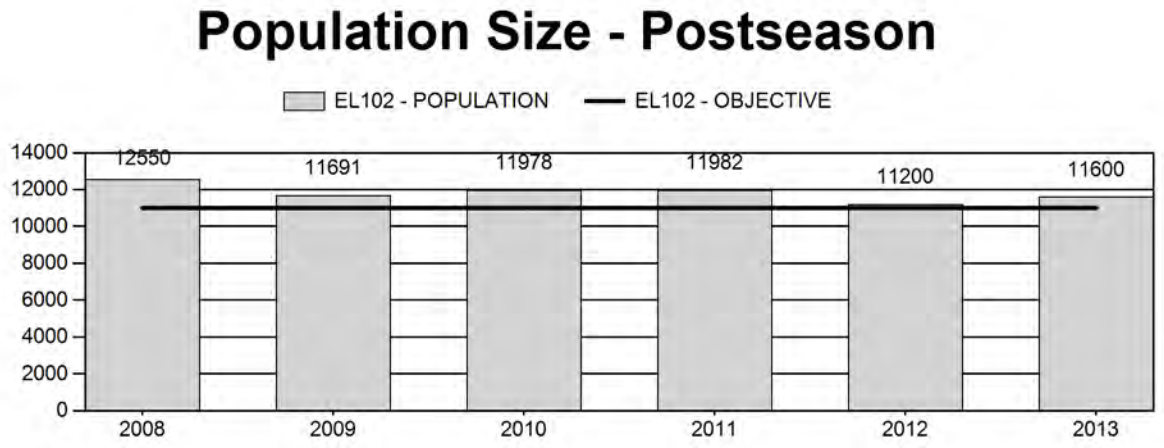
PREPARED BY: ALYSON COURTEMANCH

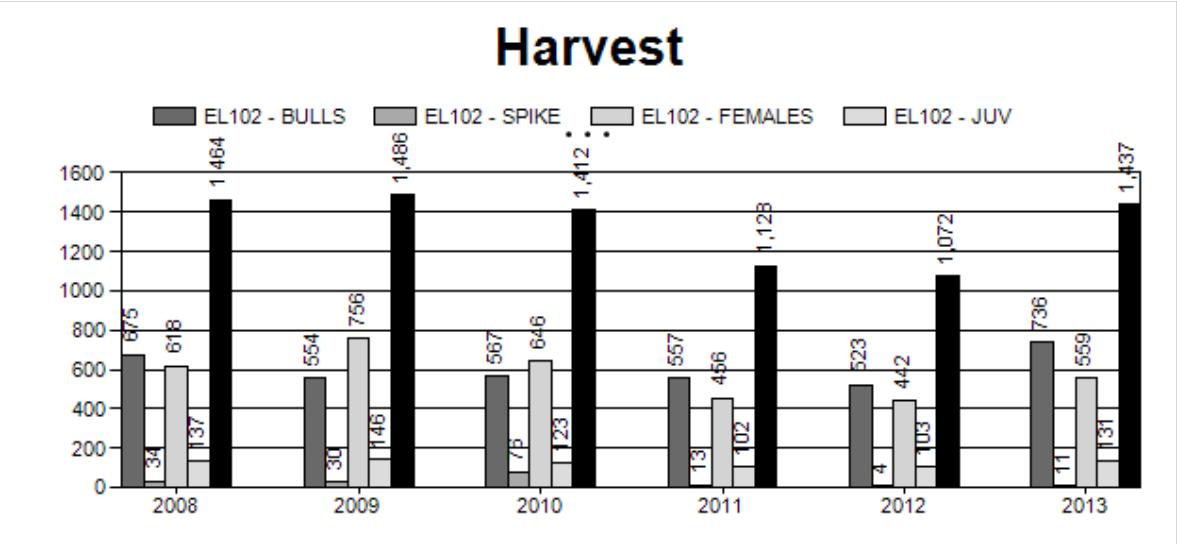
	2008 - 2012 Average	2013	2014 Proposed
Population:	11,880	11,600	11,500
Harvest:	1,312	1,437	1,400
Hunters:	3,319	2,874	2,900
Hunter Success:	40%	50%	48%
Active Licenses:	3,403	2,983	2,900
Active License Percent:	39%	48%	48%
Recreation Days:	23,090	19,517	19,000
Days Per Animal:	17.6	13.6	13.6
Males per 100 Females	29	30	
Juveniles per 100 Females	22	21	

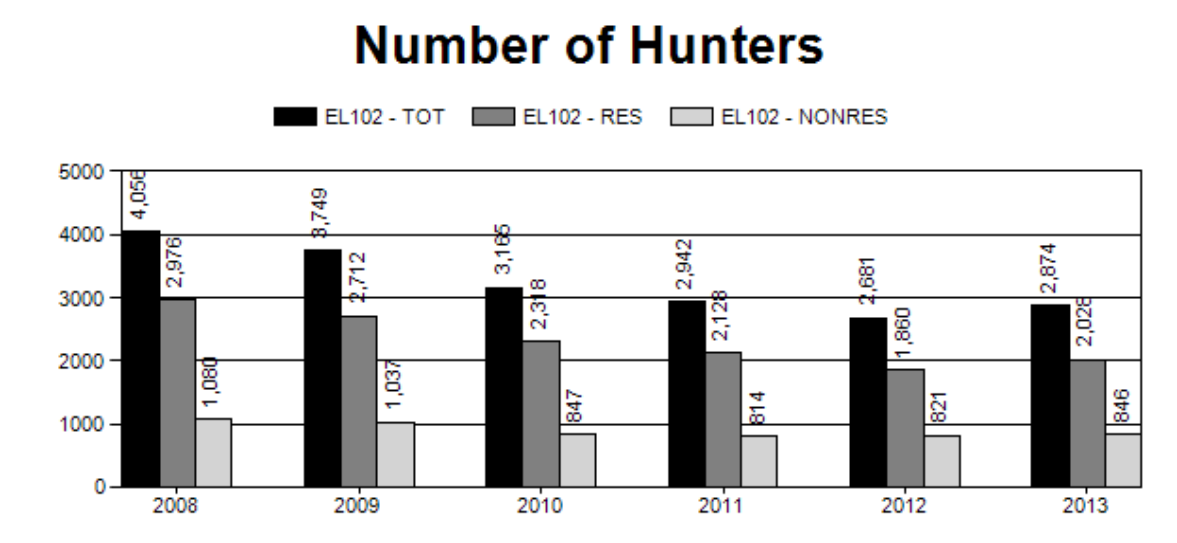
Population Objective:	11,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	5%
Number of years population has been + or - objective in recent trend:	0
Model Date:	None

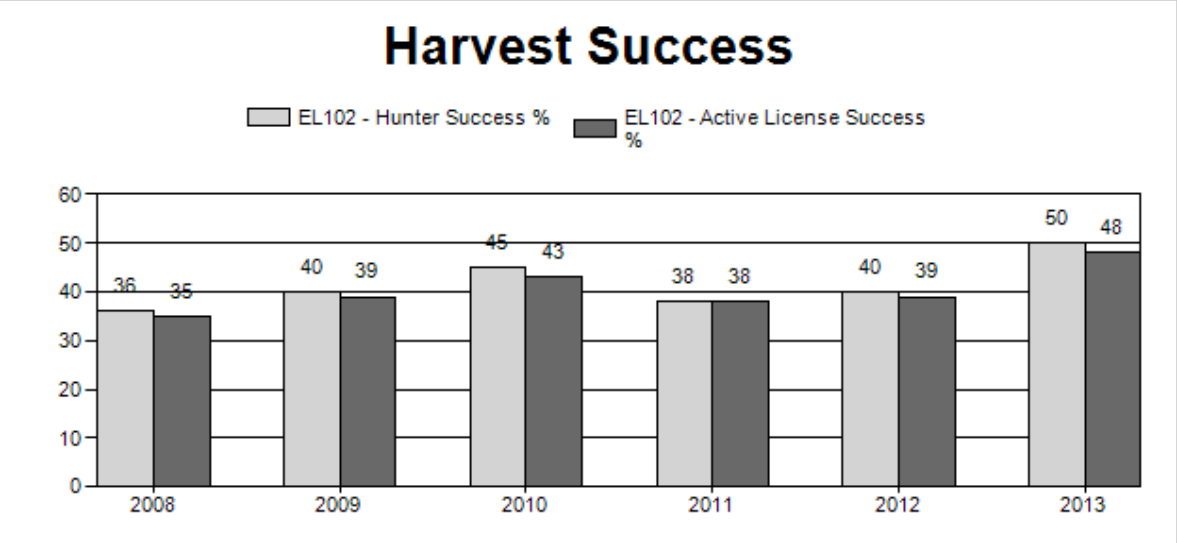
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

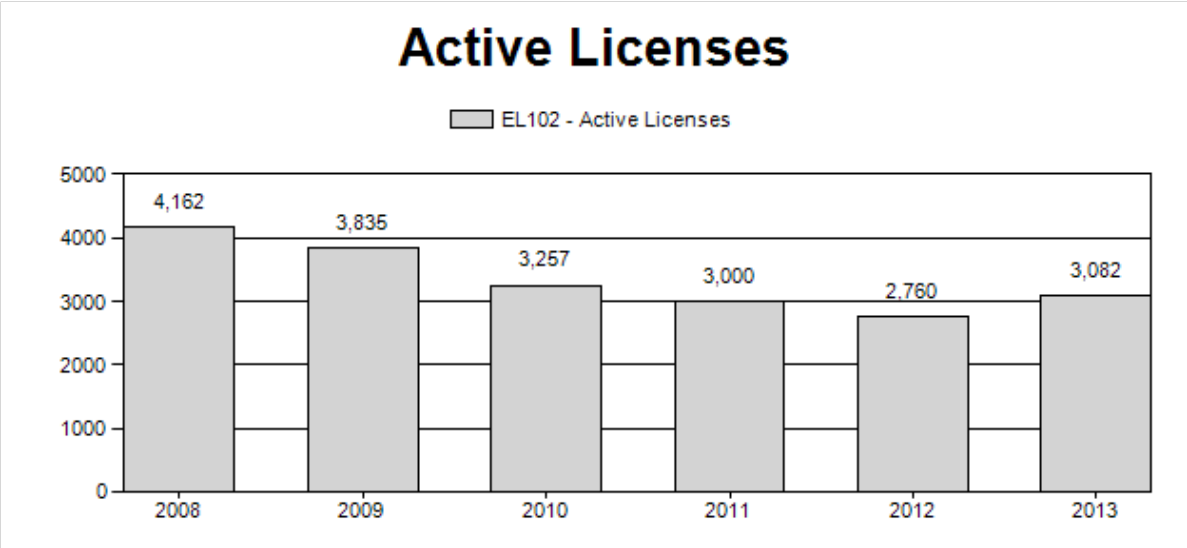
	JCR Year	Proposed
Females ≥ 1 year old:	0%	0%
Males ≥ 1 year old:	0%	0%
Juveniles (< 1 year old):	0%	0%
Total:	0%	0%
Proposed change in post-season population:	0%	0%

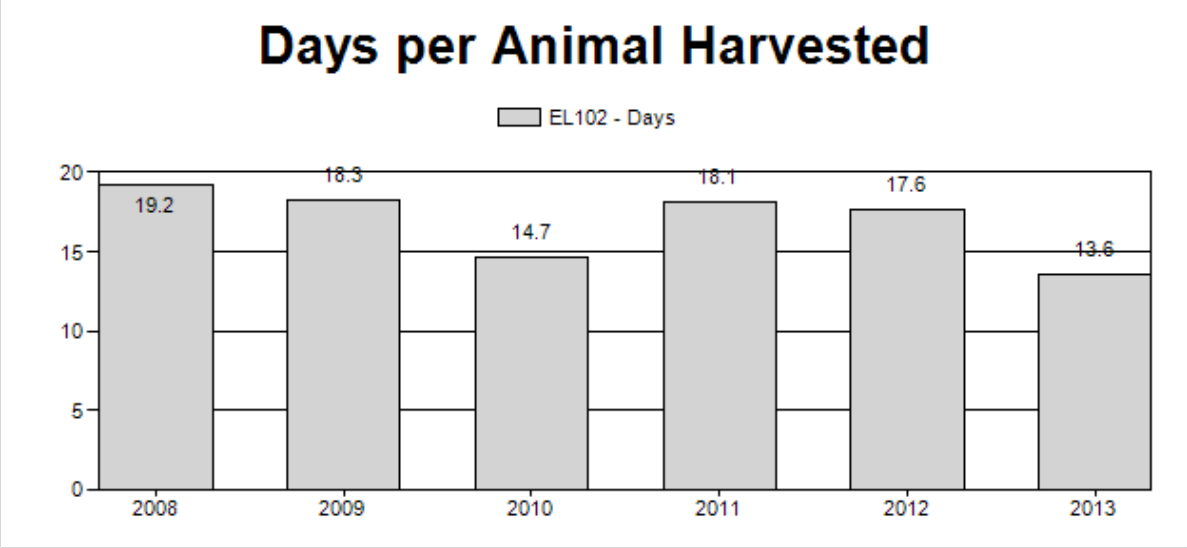


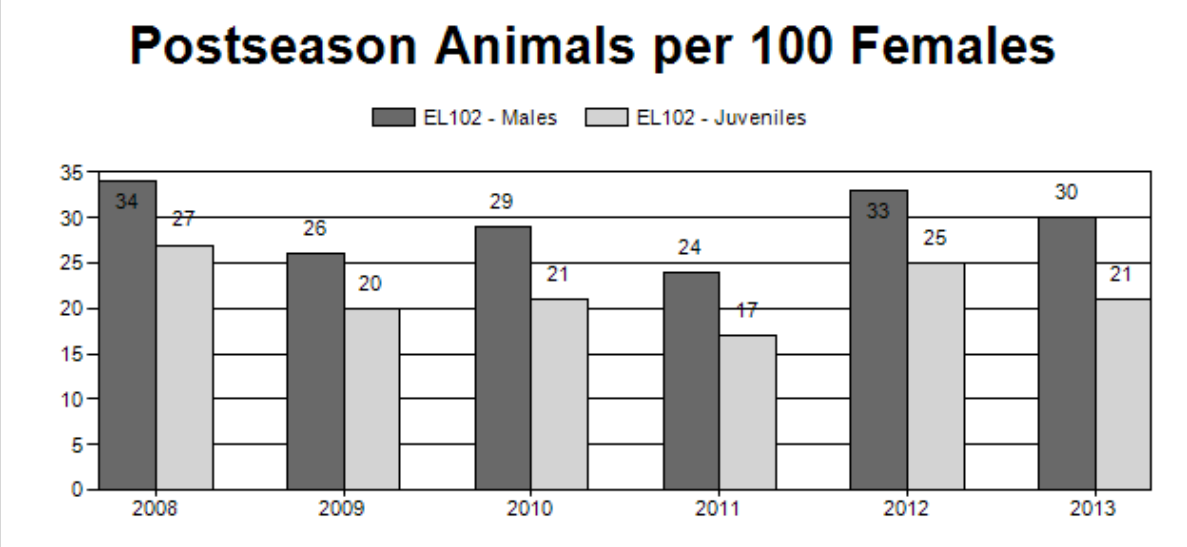

Harvest
EL102 - BULLS
EL102 - SPIKE
EL102 - FEMALES
EL102 - JUV
1600
1400
1200
1000
800
600
400
200
0
675
34
618
137
1,464
554
30
756
146
1,486
567
75
646
123
1,412
557
13
456
102
1,123
523
4
442
103
1,072
736
11
559
131
1,437
2008
2009
2010
2011
2012
2013

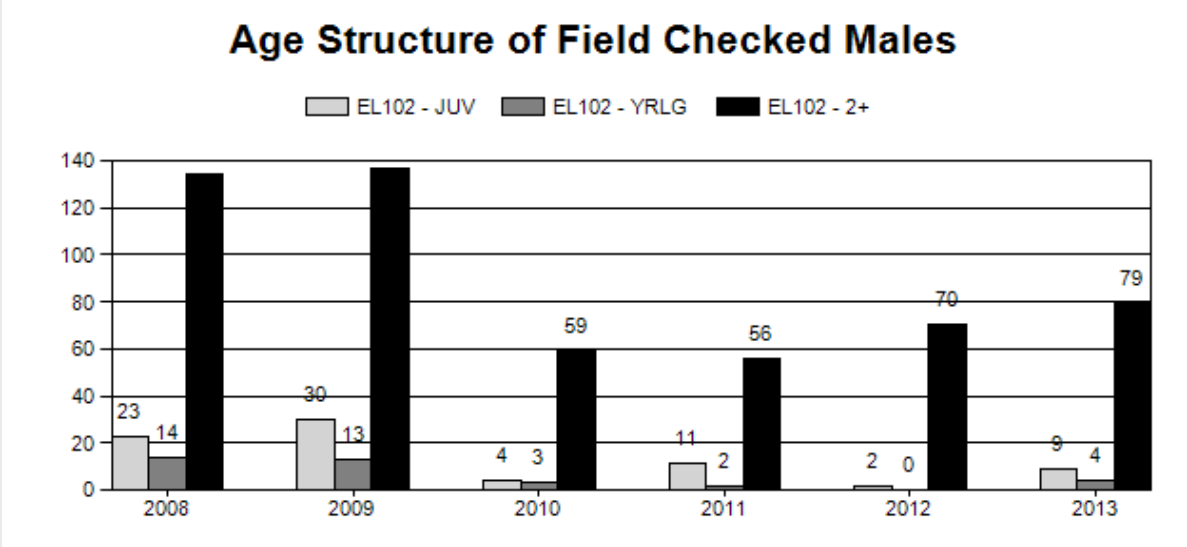

Number of Hunters
EL102 - TOT
EL102 - RES
EL102 - NONRES
5000
4000
3000
2000
1000
0
4,056
2,976
1,080
3,749
2,712
1,037
3,165
2,318
847
2,942
2,128
814
2,681
1,860
821
2,874
2,028
846
2008
2009
2010
2011
2012
2013

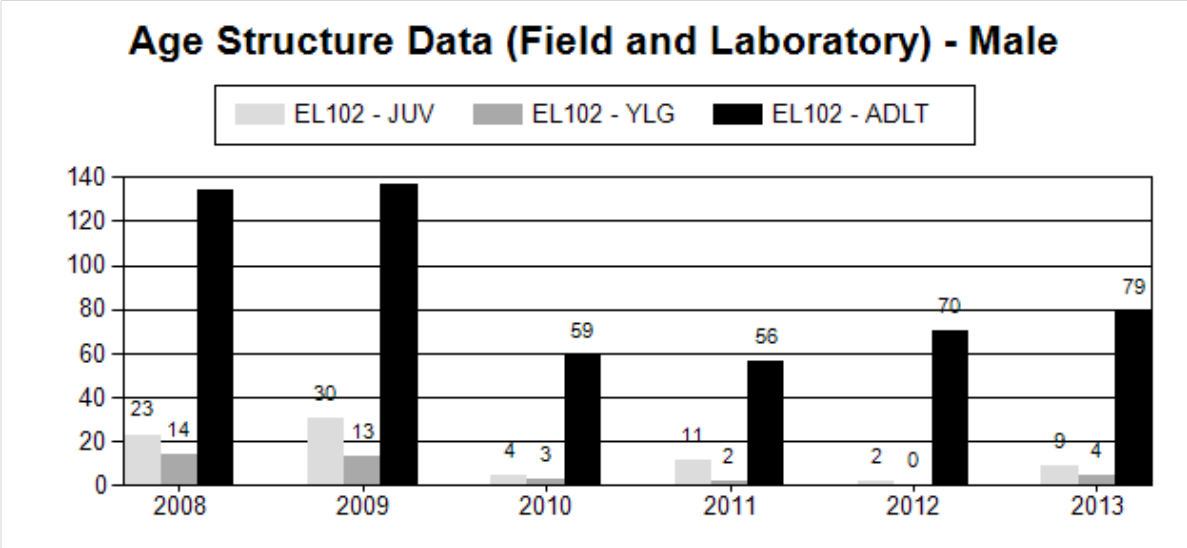

Harvest Success
EL102 - Hunter Success %
EL102 - Active License Success %
60
50
40
30
20
10
0
36
35
40
39
45
43
38
38
40
39
50
48
2008
2009
2010
2011
2012
2013


Active Licenses
EL102 - Active Licenses
5000
4000
3000
2000
1000
0
4,162
3,835
3,257
3,000
2,760
3,082
2008
2009
2010
2011
2012
2013


Days per Animal Harvested
EL102 - Days
20
15
10
5
0
19.2
18.3
14.7
18.1
17.6
13.6
2008
2009
2010
2011
2012
2013


Postseason Animals per 100 Females
EL102 - Males
EL102 - Juveniles
35
30
25
20
15
10
5
0
34
27
26
20
29
21
24
17
33
25
30
21
2008
2009
2010
2011
2012
2013


Age Structure of Field Checked Males
EL102 - JUV
EL102 - YRLG
EL102 - 2+
140
120
100
80
60
40
20
0
23
14
30
13
4
3
59
11
2
56
2
0
70
9
4
79
2008
2009
2010
2011
2012
2013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EL102 - YLG
EL102 - ADLT
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100
80
60
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14
30
13
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11
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2008
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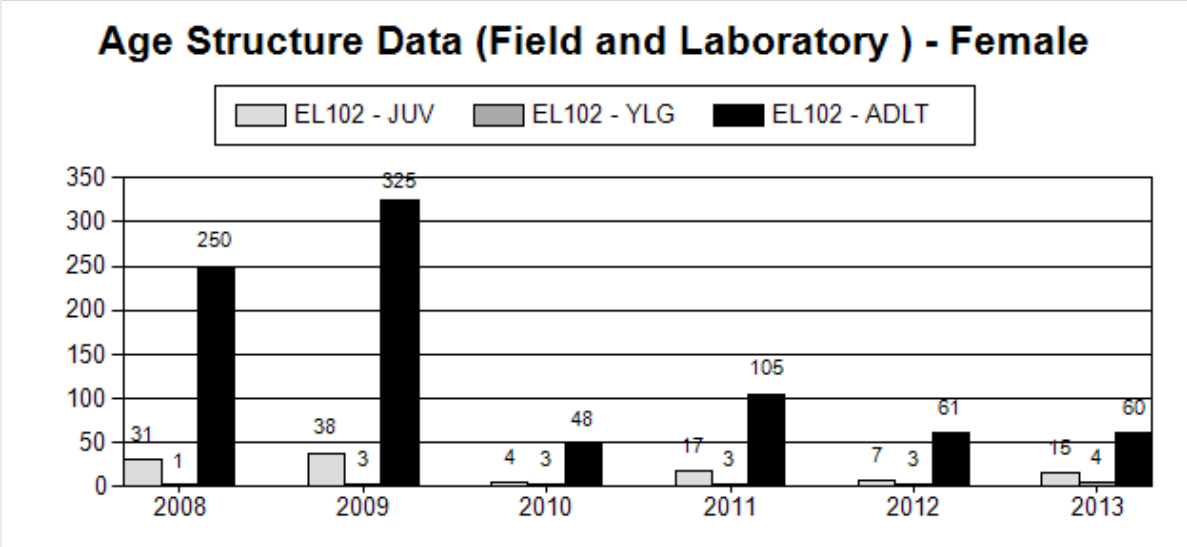
Age Structure Data (Field and Laboratory) - Female
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EL102 - ADLT
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200
150
100
50
0
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1
250
38
3
325
4
3
48
17
3
105
7
3
61
15
4
60
2008
2009
2010
2011
2012
2013

2008 - 2013 Postseason Classification Summary

for Elk Herd EL102 - JACKSON

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	12,550	585	1,588	2,173	21%	6,324	62%	1,697	17%	10,194	464	9	25	34	± 0	27	± 0	20
2009	11,691	409	1,012	1,421	18%	5,512	69%	1,093	14%	8,026	322	7	18	26	± 1	20	± 0	16
2010	11,978	659	1,589	2,248	20%	7,669	67%	1,586	14%	11,503	372	9	21	29	± 0	21	± 0	16
2011	11,982	467	1,519	1,986	17%	8,116	70%	1,417	12%	11,519	269	6	19	24	± 0	17	± 0	14
2012	11,200	601	1,693	2,294	21%	7,027	64%	1,730	16%	11,051	440	9	24	33	± 0	25	± 0	19
2013	11,600	659	1,619	2,278	20%	7,560	66%	1,585	14%	11,423	374	9	21	30	± 0	21	± 0	16

2014 HUNTING SEASONS
JACKSON ELK HERD (EL102)

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
70		Sep. 20	Oct. 31		General	Antlered elk, spikes excluded – SEE SECTION 6
		Nov. 1	Nov. 2		General	Antlered elk, spikes excluded; valid north and west of Pacific Creek and Mink Creek – SEE SECTION 6
71		Sep. 20	Nov. 2		General	Antlered elk, spikes excluded – SEE SECTION 6
72						CLOSED
75	4	Oct. 18	Nov. 30	200	Limited quota	Antlerless elk; the Snake River Bottom portion of Area 75 shall be closed, also valid in that portion of Area 81 west of the Shadow Mountain Loop Road (U.S.F.S. Road 30340) - SEE SECTIONS 6 and 7
		Dec. 1	Dec. 7			Unused Area 75 Type 4 licenses; the Snake River Bottom and Antelope Flats portion of Area 75 shall be closed - SEE SECTIONS 6 and 7
		Oct. 18	Nov. 2			Unused Area 75 Type 4 licenses also valid in Area 79 – SEE SECTIONS 6 and 7
	6	Oct. 18	Nov. 30	450	Limited quota	Cow or calf; the Snake River Bottom portion of Area 75 shall be closed - SEE SECTIONS 6 and 7

		Dec. 1	Dec. 7			Unused Area 75 Type 6 licenses; the Snake River Bottom and Antelope Flats portion of Area 75 shall be closed - SEE SECTIONS 6 and 7
77		Oct. 11	Oct. 12			General license and unused limited quota licenses; excluding limited quota cow or calf licenses and limited quota archery only licenses, valid for any elk; 70 National Elk Refuge permits may be issued only for youths 12 through 17 years of age - SEE SECTIONS 6 and 7
		Oct. 13	Oct. 19			General license and unused limited quota licenses; excluding limited quota cow or calf licenses and limited quota archery only licenses, any elk – SEE SECTIONS 6 and 7
		Oct. 20	Dec. 14			General license and unused limited quota licenses; excluding limited quota archery only licenses, antlerless elk only - SEE SECTIONS 6 and 7
78	1	Sep. 26	Jan. 31	50	Limited quota	Any elk - SEE SECTION 6
	6	Aug. 15	Sep. 9	125	Limited quota	Cow or calf, valid on private land, access to private land is limited – SEE SECTION 6
		Sep. 10	Jan. 31			Unused Area 78 Type 6 licenses valid in the entire area – SEE SECTION 6
	7	Aug. 15	Jan. 31	100	Limited quota	Unused Area 78 Type 6 licenses valid in the entire area - SEE SECTION 6
79		Oct. 18	Nov. 2			Unused Area 75 Type 4 licenses valid in Area 79 – SEE SECTIONS 6 AND 7
80		Sep. 26	Oct. 31		General	Any elk - SEE SECTION 6
		Nov. 1	Nov. 16		General	Antlerless elk - SEE SECTION 6
	6	Oct. 18	Nov. 16	100	Limited quota	Cow or calf – SEE SECTION 6
		Nov. 17	Nov. 30			General license and unused Area 80 Type 6 licenses valid for antlerless elk south of the Sheep Creek Road (U.S.F.S. Road 30445) – SEE SECTION 6
81		Sep. 26	Oct. 25		General	Antlered elk, spikes excluded - SEE SECTION 6
82		Sep. 26	Oct. 25		General	Antlered elk, spikes excluded - SEE SECTION 6
	4	Sep. 10	Oct. 25	25	Limited quota	Antlerless elk - SEE SECTION 6

83		Oct. 1	Oct. 25		General	Antlered elk, spikes excluded - SEE SECTION 6

Special Archery Seasons

Hunt Area	Dates of Seasons	
	Opens	Closes
83	Sep. 1	Sep. 30
70, 71	Sep. 1	Sep. 19
78, 80-82	Sep. 1	Sep. 25

Summary of 2014 License Changes

Hunt Area	Type	License	Quota change from 2013	Other changes from 2013
70		General		-1 day
71		General		-1 day
75	4	Limited quota	-50	+14 days to Antelope Flats area before closing.
	6	Limited quota	+50	+14 days to Antelope flats area before closing.
78	6	Limited quota	-50	+2 days
	7	Limited quota	+50	+2 days
80		General		-1 day for period before partial closure of hunt area. Change closure area to north of the Sheep Creek Road (U.S.F.S. Road 30445).
	6	Limited quota	+50	Change closure area to north of the Sheep Creek Road (U.S.F.S. Road 30445)

<u>Management Evaluation</u>
Current Postseason Population Management Objective: 11,000
Management Strategy: Recreational
2013 Postseason Population Estimate: ~11,600
2014 Proposed Postseason Population Estimate: ~11,500

The population objective for the Jackson Elk Herd is 11,000 elk. The management strategy is recreational and the objective and management strategy were last revised in 2007. The current population estimate is approximately 11,600 elk. Low calf productivity from the northern herd segments and liberal antlerless elk hunting seasons on the southern migratory segment has reduced the population to within 10% of the desired population objective.

Herd Unit Issues

Management of this herd is complicated because occupied habitat includes two National Parks and the National Elk Refuge (NER). Complex seasons are typically used to address management concerns for various population segments in this herd. Recent pre-season classification surveys indicate that elk in the southern portion of the herd unit in southern GTNP and private lands near the Snake River reproduce at twice the rate of long-distance migratory elk from the northern herd segments. These differential recruitment rates are likely driven by lower predator densities and supplemental forage from agricultural areas and exurban landscapes in the southern herd segments.

Weather

Following an extremely dry summer and fall in 2012, weather conditions in 2013 were considerably wetter. The area received significant pulses of spring and fall moisture, which improved forage conditions for elk and other big game. At the time of the mid-winter survey, winter precipitation was reported at 109% of normal. Please refer to the following web sites for specific weather station data. **http://www.ncdc.noaa.gov/temp-and-precip/time-series** and **http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html**

Habitat

There are several established aspen transects on elk winter and transitional ranges in the Gros Ventre, Buffalo Valley, and Blackrock areas. These transects have been monitored since the late 1970s. Data was collected on these transects in summers 2012 and 2013, but has not been compiled. The Red Rock Fire Ungulate Nutrition Project was initiated in 2012 in the Gros Ventre drainage. This is designed to be a long-term project to collect and analyze nutritional and mineral content of vegetation post-wildfire and evaluate the influence of fire severity on plant nutrition for ungulates. This project is scheduled to continue through at least 2016. The Dry Quad Prescribed Burn was completed in fall 2013 in cooperation with Bridger-Teton National Forest to improve elk and moose habitat. The burn treated approximately 60 acres of decadent aspen stands south of Spread Creek. Please refer to the 2013 Annual Report Strategic Habitat Plan Accomplishments for Jackson Region habitat improvement project summaries (**http://wgfd.wyo.gov/web2011/wildlife-1000708.aspx)**.

Field Data

Postseason classification surveys were conducted February 18 – 27, 2014. A total of 11,423 elk were counted including 7,560 females, 1,585 calves, 659 yearling males, and 1,619 adult males. Herd Unit ratios were 21 calves:100 cows, 21 adult males:100 cows and 9 yearling males:100 cows. Approximately 73% of the herd was counted on southern portions of the National Elk Refuge (NER), while 17% was split between the Patrol Cabin and Fish Creek feedgrounds in the Gros Ventre. Only 10% of the herd was observed on native winter range, compared to 19% last year. This distribution shift to feedgrounds this winter is likely due to the above average snowpack. The distribution shift led to approximately 2,000 more elk on feed this winter on the

NER than last year. The area experienced relatively shallow snow depths for much of December and January, contributing to the NER and WGFD decision to delay the initiation of elk feeding until February 4, 2014, which is 9 days later than the average date of January 26. Several large snowstorms in early February caused elk to move onto feedgrounds and by the time of the postseason classification surveys, we observed relatively few elk on native ranges in the northern portion of the NER, Hunt Area 80, and in southern Grand Teton National Park (GTNP).

Preseason elk classification surveys were flown by GTNP personnel July 31 and August 1, 2013. A total of 923 elk were classified in the Central Valley, Elk Ranch/Uhl Hill, and Willow Flats areas of GTNP including 588 cows, 176 calves, 106 mature bulls and 53 yearling bulls. Ratios were 34 calves:100 cows and 38 mature bulls:100 cows.

Postseason calf:cow ratios have improved in the upper Gros Ventre, east of Crystal Creek, over the past two years. Calf:cow ratios were lowest in 2009 and 2010, being observed at 13:100 and 11:100 respectively. Ratios improved in 2012 at 23:100 and were similar this year at 22:100. Mature bull ratios continue to be low; this year the ratio was 8 mature bulls per 100 cows. Spike bull ratios were up slightly at 8:100 compared to 5:100 in 2012 and 6:100 in 2011. In comparison, calf:cow ratios were higher this year on the National Elk Refuge at 20:100 versus 15:100 in 2012.

Increased numbers of elk on southern portions of the NER this year suggests that current management direction to maintain liberal seasons on elk that migrate from the southern portion of the herd unit is needed, while keeping a conservative season structure for elk that migrate longer distances from the northern segments of the herd. Increasing harvest pressure on elk in southern GTNP, Hunt Area 80, and Hunt Area 78 will help achieve management goals for the herd.

Harvest Data

The 2013 harvest continued to focus hunting pressure on southern GTNP elk with most cow harvest occurring in Area 75 (226 cows), followed by Area 77 (134 cows). The most mature bull harvest occurred in Area 81 (263 bulls). Hunter numbers in 2013 increased for the first time in the past 6 years to 2,874, an increase 183 from 2012. Hunter success was also the highest it has been in the past 6 years at 50%.

Total bull harvest has been declining in the Jackson herd since 2001. However, bull harvest increased substantially this year to 736 mature bulls, a 40% increase over last year. This was partly due to weather events during the 2013 season that increased harvest success. The WGFD has made changes over the past decade to season length and established antlered only spikes excluded seasons. There were no any elk licenses offered in GTNP in 2012 or 2013. Spikes excluded seasons were initiated in 2007 in Areas 81-83 in an effort to improve yearling bull recruitment in the Gros Ventre drainage and hunting seasons were shortened in 2008. In the Teton Wilderness, spikes excluded seasons were initiated in 2011 to address low recruitment. It appears that the population is responding to these changes with higher bull ratios observed during the past couple of years.

Population

The 2013 mid winter trend count indicates that this population remained relatively stable near the population objective of 11,000. The small increase observed this year (372 more animals counted) may be a factor of improved counting conditions due to consistent deep snow in the region and or a potential increase in the population.

Management Summary

Hunting seasons in 2014 will again focus hunting pressure on southern resident elk along the Snake River corridor. Trend data indicate the Jackson Elk Herd has declined in recent years, but may now be stable within 10% of the population objective. To prevent further declines in the Yellowstone and Teton Wilderness long distance migratory segments, elk hunting seasons in Hunt Areas 70, 71, and 79 will remain the same as 2013, closing on November 2. This will encourage elk to stage in the Moran area and ensure that hunting pressure will not displace elk off transitional ranges. The northern portion of Area 80 will close on November 16 to protect northern migrants while allowing hunters to access these areas when Snake River corridor elk are likely available to harvest. The southern portion of Area 80 (south of the Sheep Creek Road) will close on November 30 to coincide with winter closures on Bridger-Teton National Forest. Area 75 will close on December 7, Area 77 will close on December 14, and Area 78 will close on January 31. The Antelope Flats portion of Area 75 will remain open until November 30 this year, which is 2 weeks longer than last year. These later closing dates are designed to maintain hunting pressure on elk from southern GTNP and private lands along the Snake River. In addition, Type 6 licenses will be increased in Area 75 and Area 80, and a Type 7 (archery or muzzleloader only) license will be added in Area 78 to facilitate antlerless harvest on private lands. Recent pre-season classification surveys indicate that elk in the southern portion of the herd unit reproduce at twice the rate of migratory elk from the northern migratory herd segments. Land along the Gros Ventre River south of Kelly Road will remain open to hunting this year and elk hunters will again be allowed to access the NER in this area while the Snake River Bottom portion of Area 75 will be closed to hunters again this year. The annual Grand Teton National Park elk reduction program are attached in Appendix A.

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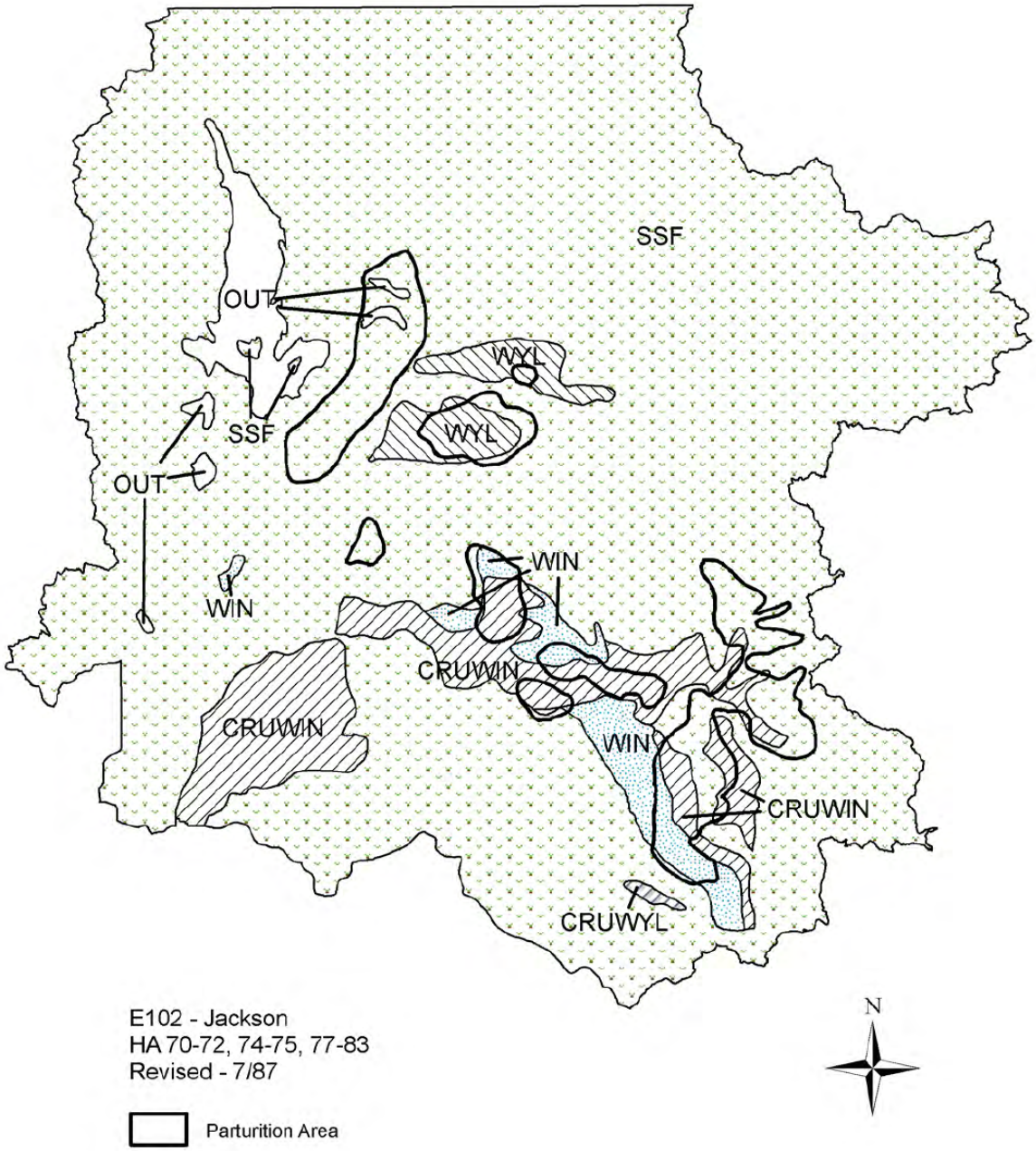
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E102 - Jackson
HA 70-72, 74-75, 77-83
Revised - 7/87
Parturition Area

2013 Jackson Elk Monitoring Annual Report
Permit #798

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Project Background

The Jackson elk herd ranges across 2,100 square miles, about 98 percent of which is federally administered. The herd is composed of four segments that migrate to distinct summer ranges in Grand Teton National Park, the Gros Ventre drainage, Teton Wilderness, and southern Yellowstone National Park. Herd management is complex because the elk occupy two national parks, and large expanses of designated wilderness. During the winter elk migrate to winter ranges on and adjacent to the National Elk Refuge or the three feedgrounds in the Gros Ventre drainage.

The postseason population objective for the Jackson Elk herd is 11,000 elk. The current trend counts indicate the Jackson elk herd is within 10% of the postseason objective. While the overall population may be at objective managers believe resident elk populations from Yellowstone National Park (YNP), Teton Wilderness and Gros Ventre are below desired population goals and that the current population estimate is influenced by a growing elk population residing along the Snake River corridor near Jackson.

Migratory elk from the northern portion of the Jackson Elk Herd have lower calf:cow ratios than do elk in the southern portion of the herd unit near developed areas. The lower calf:cow ratios observed in the northern portion of the herd unit are likely influenced by predation.

In addition to the lower calf:cow ratios, winter trend data collected from the northern portion of the herd unit also indicate elk numbers have declined. These changes are in part due to lower calf:cow ratios although predator densities are likely influencing elk distribution in this area. In the Buffalo Valley, an average of 766 elk was observed annually on winter ranges from 1999 – 2005. During surveys conducted from 2006 – 2012 the average number of elk observed was 70 percent lower (230 elk) (Figure 1).

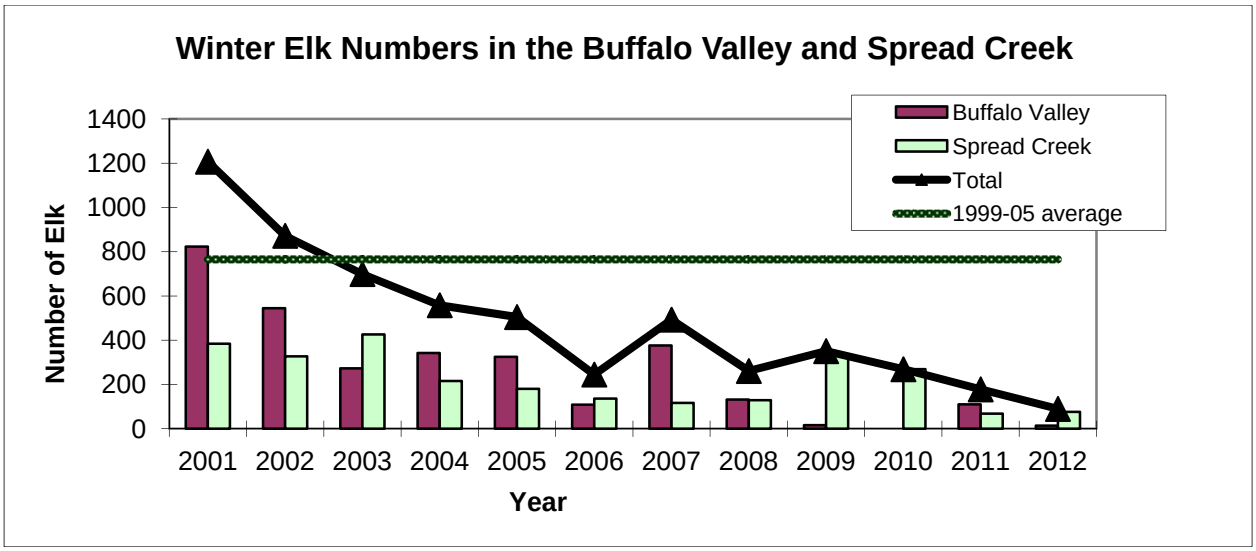


Figure 1. Winter elk numbers within the Buffalo Valley/Spread Creek area 1999 – 2011.

Harvest strategies have also changed during this time. Since the 1990s Hunt Area 79 has been managed as a limited quota hunt area focusing on resident elk in northern GTNP and migratory elk from YNP. An average of 1,760 licenses were issued annually from 1994 – 2000. During 2001 managers began to decrease the number of licenses available for this area. A total of 25 antlerless licenses were issued in 2012 and in 2013 no licenses were issued specifically for Area 79(Figure 2). Instead hunters with an Area 75 Type 4 license were allowed to hunt in Area 79 through November 3.

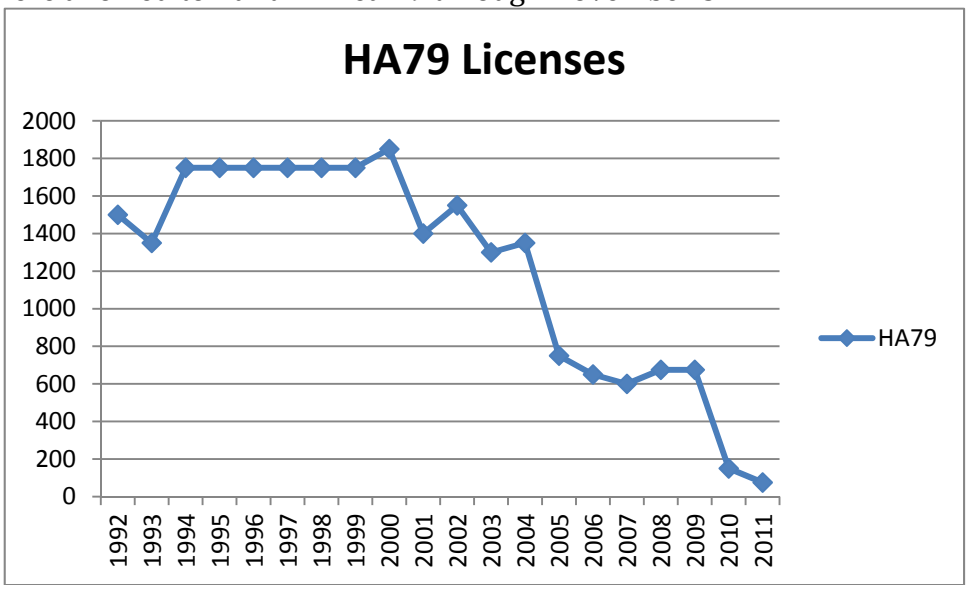


Figure 2. Limited quota license quotas for Hunt Area 79 in GTNP from 1992 - 2011.

Results

In January 2012, eight adult female elk were captured and radio collared in the Buffalo Valley near the southern boundary of Hunt Area 70 (Table 1). A breakaway mechanism on the GPS collar is programmed to release when elk are on winter ranges during March 2014.

Elk were also collared with a micro VHF collar which will begin transmitting continuously during the daytime hours after the GPS collars drop off in 2014. Depending on temperature these collars are expected to transmit through 2019.

During 2013 elk caputred in the Buffalo Valley were relocated periodically during the year. Additional efforts will be made during February and March 2014 to locate these animals before scheduled collar drop.

Table 1. Radio collared elk markings and capture locations during 2012. Note: Elk 707 radio collar put on an elk at the Patrol Cabin Feedground after 707 was killed by wolves in the Buffalo Valley.

VISnumber	ID	GPSFREQ	MODFREQ	EARTAG1	EARTAG2	AGE	CaptureE	CaptureN
1A	**701**	166.3870	SAME	G8404	8405	**5**	545575	4852465
2A	**702**	166.4670	SAME	G8406	8407	**5**	547746	4854433
3A	**703**	166.4880	SAME	G8408	8409	**6**	549894	4852379
4A	**704**	167.6400	SAME	G8410	8411	**4**	546253	4852138
5A	**705**	166.6800	SAME	G8412	8413	**2**	544633	4853057
6A	**706**	166.6900	SAME	G8414	8415	**4**	547746	4851514
7A	**707**	166.7100	SAME	35DXV7199		**4**	547377	4855213
8A	**708**	166.7600	SAME	G8418	8419	**ad**	544540	4853210
7A	**540**	166.7100	SAME	gv0033	gv0034		556643	4824440

Note: Elk 7A originally tagged by Iowa State in the Buffalo Valley March 1, 2006.

During 2013, twelve elk were captured in southern Yellowstone National Park (Figure 3). Similar to the Buffalo Valley captures, elk were double radio collared to provide a two tiered data collection sequence including an intensive period to monitor distribution and movements followed by a less intensive period to continue monitoring demographic parameters and migration timing. To accomplish this, each elk was fitted with Lotek global positioning system (GPS) and Telonics (Mod 400) micro very high frequency (VHF) radio collar (Table 2). The micro collars transmit during a two hour interval every other day and start transmitting every day for 12 hours December 15, 2014. A breakaway mechanism on the GPS collar is programmed to release when elk are on winter ranges January 15, 2016. The transmission overlap will help when locating animals should the GPS collar fail. Two (17%) of the 12 elk captured in July tested positive for brucellosis. During the first two weeks of monitoring, elk 910 was detected on mortality. The cause of mortality was undetermined but and likely related to capture. Elk 915 was detected on mortality August 26 and due to fire activity and weather patterns this collar was not retrieved until October. The cause of death was undetermined.

Project objectives are to describe spatial and temporal patterns in elk movements and survival for the northern migrants in the Jackson elk herd, examine variations among herd segments within a year and from year to year and evaluate distribution of elk within the homeranges of the wolf packs in Jackson Hole.

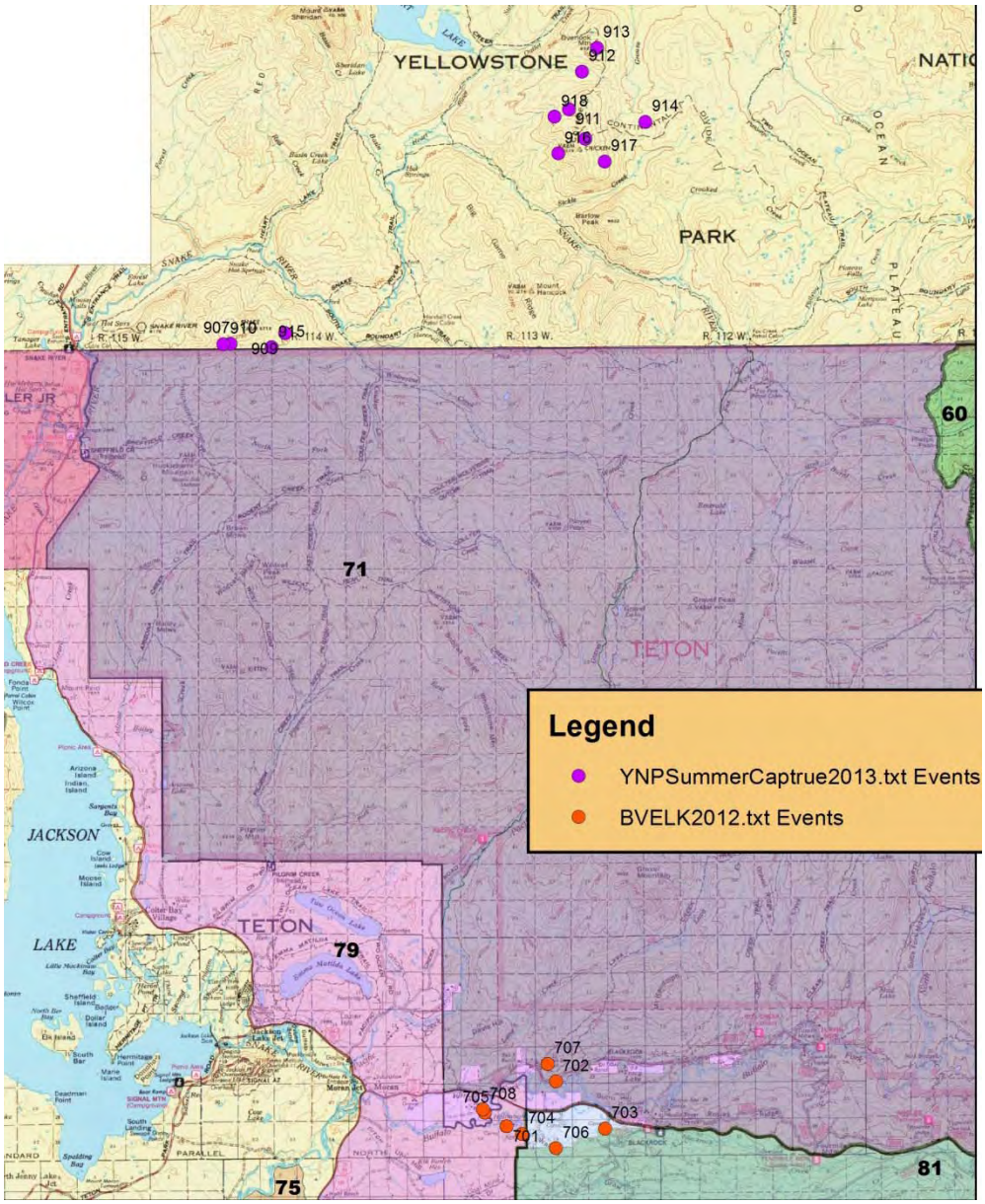


Figure 3. Elk capture locations and elk ID for elk captured during 2012 and 2013.

Specific project objectives include:

Determine migration timing and migration routes used for elk and evaluate the spatial and temporal variation in migration;
Monitor and evaluate elk survival and distribution compared to the home ranges of wolves;
Evaluate the timing and use of open hunt areas by elk;
Document areas used by elk during calving and evaluate fidelity to such areas;
Evaluate fidelity to summer ranges for elk;
Monitor winter movements of elk between native winter ranges and feedgrounds; and
Determine harvest rates and harvest locations of elk.

Table 2. Yellowstone elk ID, radio frequency, visibility tag and location of capture July 16, 2013.

ELK_ID	SerialVHF	MOD400VHF	LotekGPSFreq	VISTag1	VISTag2	Drop	CaptureE	CaptureN	CaptureDate	Age
907	671475A	166.155	166.154	Yellow28	Yellow29	1/12/2016	533432	4886960	7/16/2013	4
908	671464A	167.117	167.117	Yellow30	Yellow31	1/12/2016	548972	4895923	7/16/2013	
909	671465A	167.131	167.131	Yellow32	Yellow33	1/12/2016	535824	4887425	7/16/2013	3
910	671466A	167.194	167.194	Yellow34	Yellow35	1/12/2016	533128	4886937	7/16/2013	5 - 6
911	671467A	167.531	167.531	Yellow36	Yellow37	1/12/2016	548260	4897209	7/16/2013	7
912	671468A	167.568	167.568	Yellow38	Yellow39	1/12/2016	548820	4898878	7/16/2013	8
913	671469A	167.605	167.617	Yellow40	Yellow41	1/12/2016	549473	4899912	7/16/2013	8
914	671470A	167.669	167.669	Yellow42	Yellow43	1/12/2016	551598	4896672	7/16/2013	2
915	671471A	167.793	167.793	Yellow44	Yellow45	1/12/2016	535234	4886804	7/16/2013	9
916	671472A	167.804	167.804	Yellow46	Yellow47	1/12/2016	547778	4895292	7/16/2013	8
917	671473A	167.879	167.879	Yellow48	Yellow49	1/12/2016	549810	4894940	7/16/2013	6
918	671474A	167.93	167.93	Yellow50	Yellow51	1/12/2016	547620	4896900	7/16/2013	4 - 5

Since July elk were located during five flights (Figure 4). Elk captured in July started leaving Yellowstone National Park October 1 and the first radio collared elk arrived on the NER November 9, 2013. By mid-December, eight of the 10 elk were on or near the National Elk Refuge. Elk migrated through the Teton Wilderness along three different migration routes. These included Mink Creek, Pilgrim Creek and east of Jackson Lake (Figure 5). No radio collared elk from Yellowstone were harvested during the 2013 season.

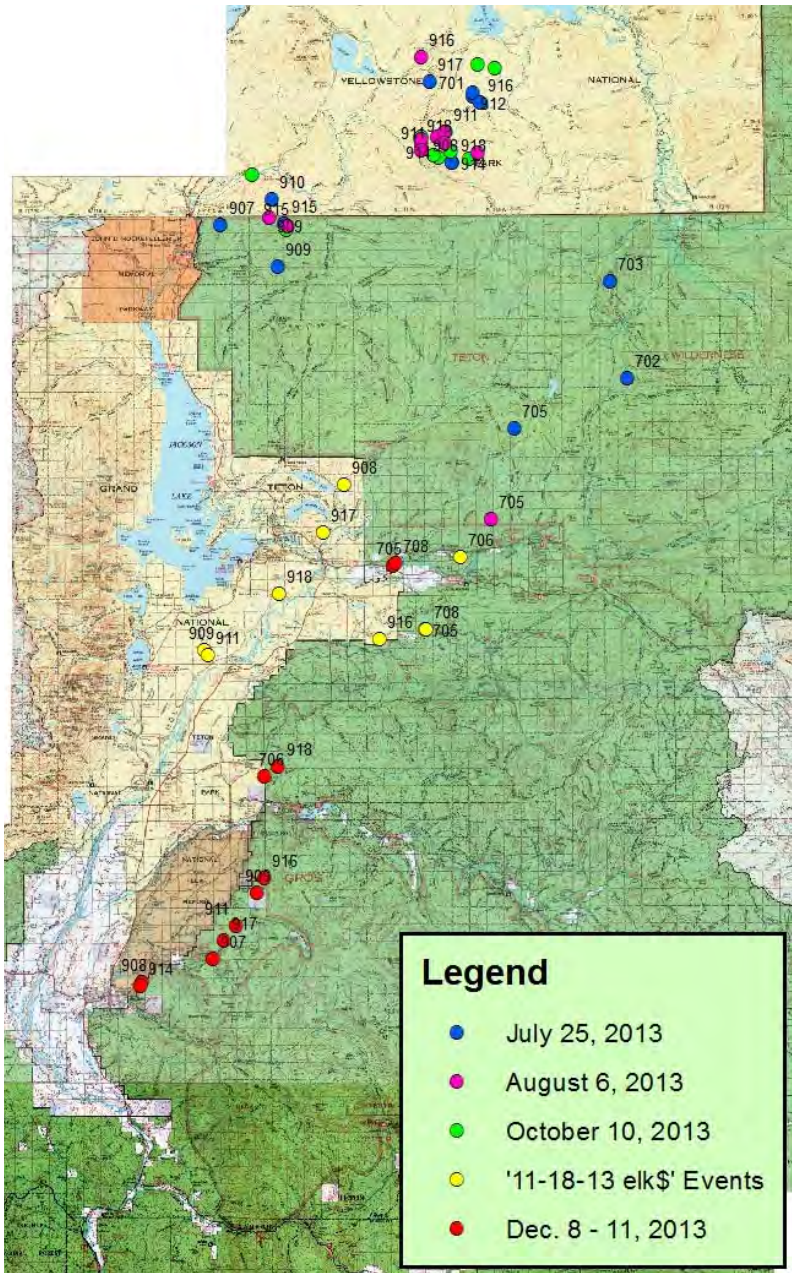


Figure 4. GPS collar locations during July, August, October, November and December 2013.

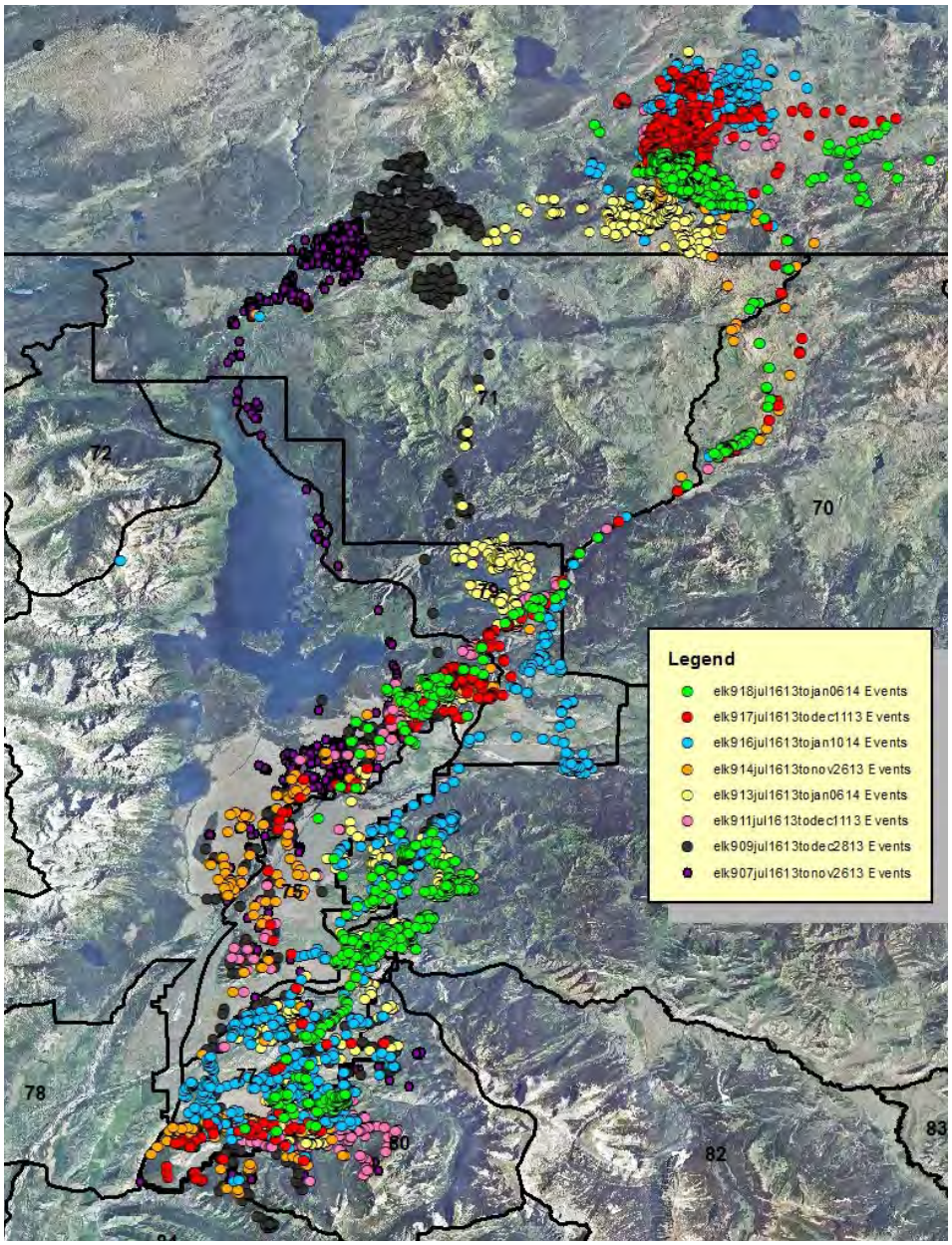


Figure 5, Radio collar down loads from eight GPS collared elk from Yellowstone National Park during late summer to early winter 2013.

2013 - JCR Evaluation Form

SPECIES: Elk | PERIOD: 6/1/2013 - 5/31/2014

HERD: EL103 - FALL CREEK

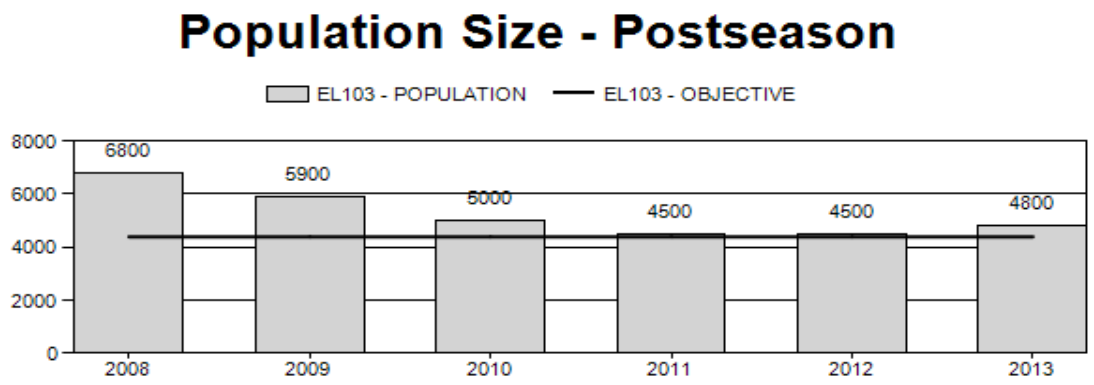
HUNT AREAS: 84-85 | PREPARED BY: GARY FRALICK

	2008 - 2012 Average	2013	2014 Proposed
Population:	5,340	4,800	4,400
Harvest:	1,029	726	582
Hunters:	2,648	2,123	2,000
Hunter Success:	39%	34%	29%
Active Licenses:	2,783	2,231	2,000
Active License Percent:	37%	33%	29%
Recreation Days:	21,343	15,271	13,967
Days Per Animal:	20.7	21.0	24.0
Males per 100 Females	23	25	
Juveniles per 100 Females	28	34	

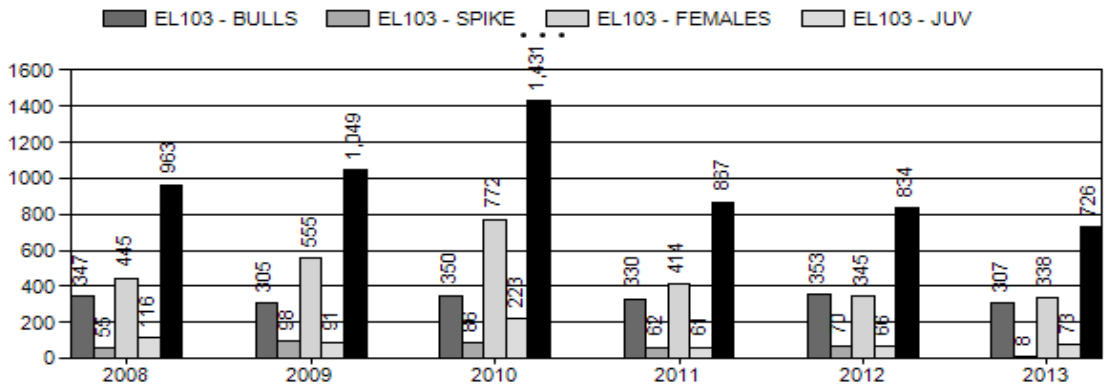
Population Objective:	4,400
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	9%
Number of years population has been + or - objective in recent trend:	10
Model Date:	02/23/2014

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

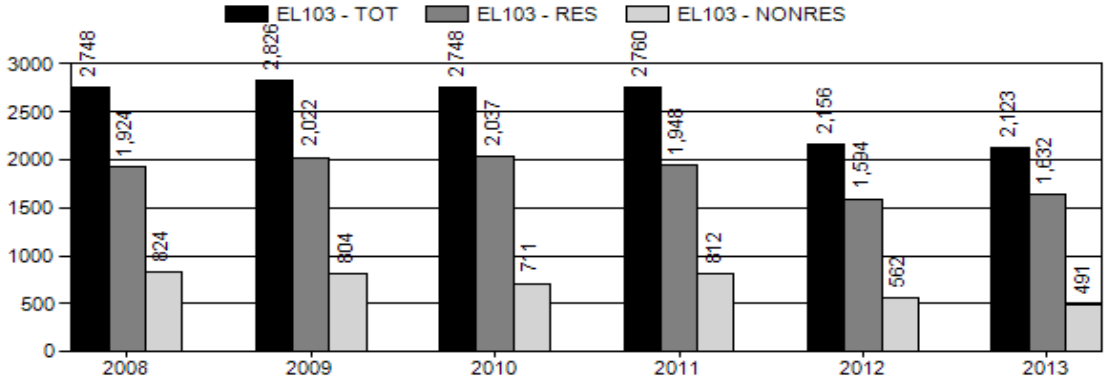
	JCR Year	Proposed
Females ≥ 1 year old:	10%	10%
Males ≥ 1 year old:	43%	27%
Juveniles (< 1 year old):	5%	9%
Total:	12%	15%
Proposed change in post-season population:	16%	10%



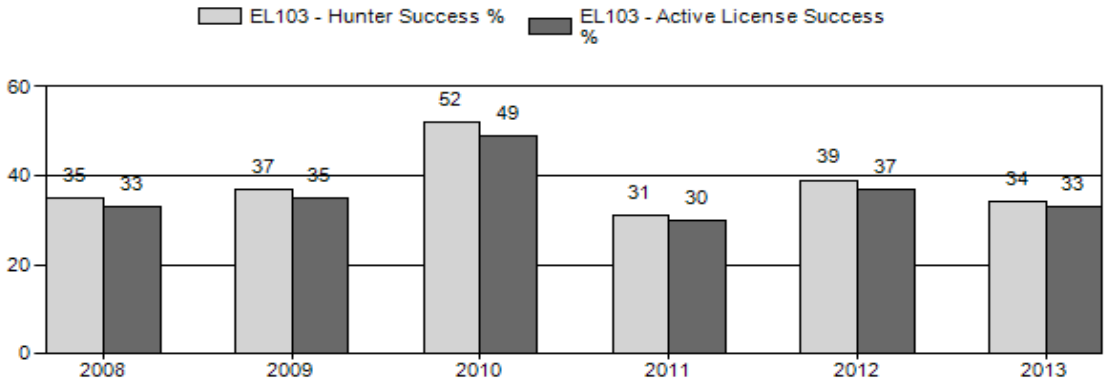
Harvest



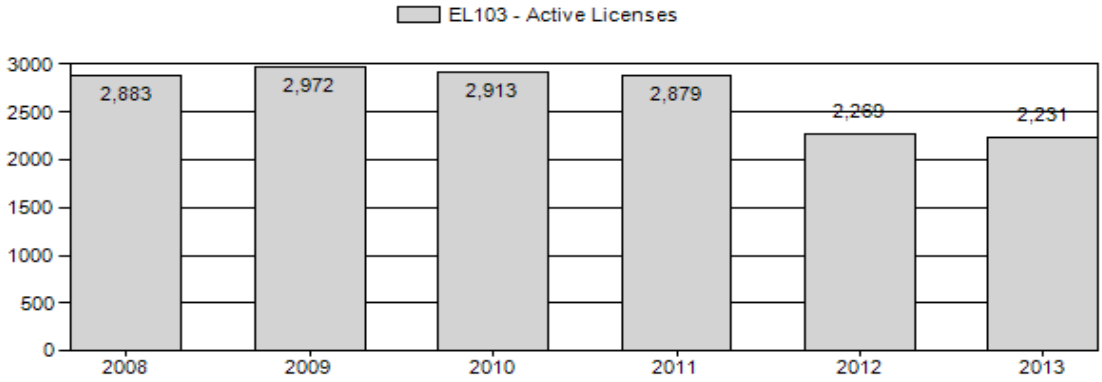
Number of Hunters



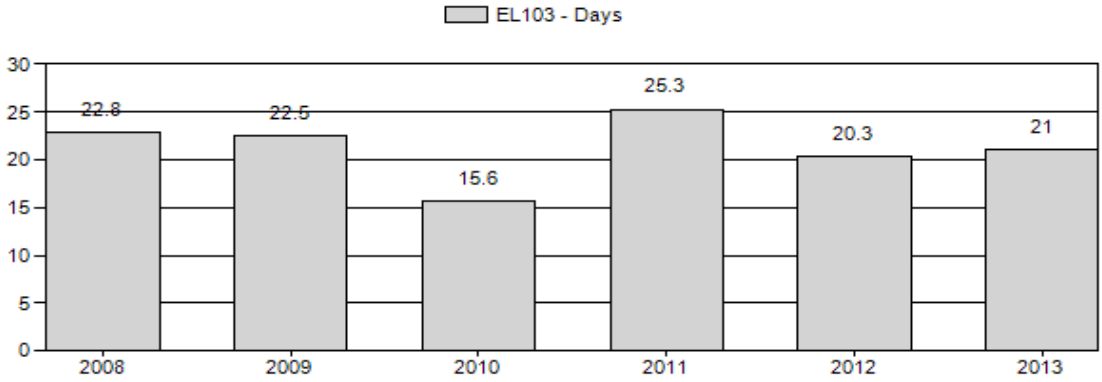
Harvest Success



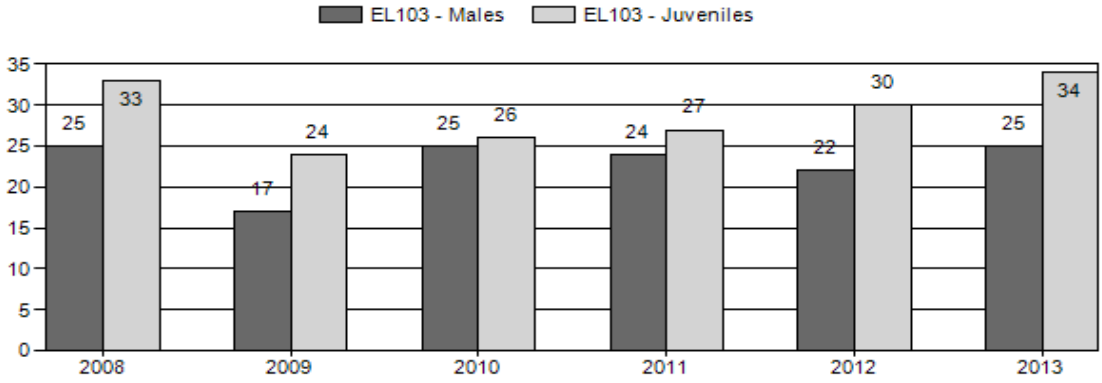
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Elk Herd EL103 - FALL CREEK

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	6,800	371	508	879	16%	3,556	63%	1,177	21%	5,612	405	10	14	25	± 0	33	± 1	27
2009	5,900	206	309	515	12%	3,100	71%	748	17%	4,363	263	7	10	17	± 1	24	± 1	21
2010	5,000	290	484	774	17%	3,115	66%	796	17%	4,685	0	9	16	25	± 0	26	± 0	20
2011	4,500	198	487	685	16%	2,841	66%	766	18%	4,292	317	7	17	24	± 0	27	± 0	22
2012	4,500	215	379	594	15%	2,663	66%	804	20%	4,061	0	8	14	22	± 0	30	± 0	25
2013	4,400	318	309	627	16%	2,498	63%	842	21%	3,967	0	13	12	25	± 0	34	± 1	27

2014 HUNTING SEASON

SPECIES: ELK **HERD UNIT: FALL CREEK (EL103)**

HUNT AREA	TYPE	OPENS	CLOSES	QUOTA	LIMITATIONS
84		Sep. 26	Oct. 31		General license; Any elk, spikes excluded – SEE SECTION 6.
	1	Nov. 1	Jan. 31	20	Limited quota; Any elk valid on private land west of U.S. Highway 191 and north and east of the Snake River starting at the South Park Bridge; access to private land is limited – SEE SECTION 6.
	6	Sep. 26	Nov. 20	100	Limited quota; Cow or calf; that portion of Area 84 east and south of Granite Creek to the Hoback River shall be closed after October 31 – SEE SECTION 6.
		Nov. 21	Jan. 31		Unused Area 84 Type 6 and Area 85 Type 6 licenses valid in that portion of Area 84 on private land west of U.S.

					Highway 191 and north and east of the Snake River starting at the South Park Bridge; access to private land is limited – SEE SECTION 6.
	7	Aug. 15	Jan. 31	75	Limited quota; Cow or calf valid on private land west of U.S. Highway 191 and north and east of the Snake River starting at the South Park Bridge; access to private land is limited – SEE SECTION 6.
85		Sep. 26	Oct. 31		General license; Any elk, spikes excluded – SEE SECTION 6
	6	Sep. 26	Oct. 31	25	Limited quota; Cow or calf – SEE SECTION 6.
		Nov. 1	Jan. 31		Unused Area 84 Type 6 and Area 85 Type 6 licenses valid on private land in that portion of Area 85 north of Butler Creek; access to private land is limited – SEE SECTION 6
84, 85		Sep. 1	Sep. 25		General license; Archery only - SEE SECTION 3.

SUMMARY OF CHANGES BY LICENSE NUMBER

Area	Type	Change from 2013
84	General	Eliminate Nov. 1-30 antlerless elk hunt in Cache Cr drainage
84	6	Decrease Type 6 licenses from 400 to 100
84	7	Increase number of licenses from 50 to 75 and open season on August 15 instead of September 1
85	6	Reduce Type 6 licenses from 50 to 25 licenses
Herd Unit Total	6	-325
	7	+25
	Total	-300

Management Evaluation

Current Postseason Population Management Objective: 4,400
Management Strategy: Recreational
2013 Postseason Population Estimate: ~4,800
2014 Proposed Postseason Population Estimate: ~4,400

The population objective for Fall Creek elk herd is 4400 elk. The management strategy is recreational management. The objective and management strategy were last revised in 2011. The current population estimate of 4800 elk is within +/- 20% of the population objective. Low calf productivity and management strategies associated with November hunting seasons that targeted the antlerless segment of the population have stabilized the population near the population objective.

Herd Unit Issues

The most substantial herd unit issues continue to be associated with elk numbers inhabiting private property along the Snake River Bottomlands and maintaining elk numbers at or near desired feedground quotas on the Dog Creek feedground in Area 85. Late season depredation hunts have been implemented over the last 20 years in an effort to encourage elk to move to the South Park feedground thereby minimizing this potential conflict situation. Substantial reductions in antlerless elk hunting opportunities have resulted from lower than desired elk numbers in Area 85.

Weather

Weather conditions during the 2013 were extremely dry during the early portion of the summer. By late summer the moisture regime had changed frequent precipitation scenario that persisted into the fall hunting season. Drought conditions in the early portion of the summer abated by late fall as persistent snow storms began to deposit snowpack in the Snake River Mountain Range. By late winter 2014 snowpack in western Wyoming watersheds were estimated to be well-above normal. Please refer to the following web sites for specific weather station data: http://www.ncdc.noaa.gov/temp-and-precip/time-series and **http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html** .

Habitat

No habitat data has been collected on elk summer and winter ranges. There are no established vegetation transects in this herd unit. Please refer to the 2012 Annual Report Strategic Habitat Plan Accomplishments, pages 61-77 for Jackson Region habitat improvement project summaries **(http://wgfd.wyo.gov/web2011/wildlife-1000708.aspx)**.

Field Data

The Fall Creek elk herd is capable of rapid growth because of high calf production in excess of 30 calves:100 cows, and associated high juvenile survival. Since 2009, population growth has been suppressed by lower calf production coupled with November antlerless elk hunts that have targeted the reproductive segment of the population. This management strategy has resulted in the desired management objective of reducing the population to within 20% of the population objective. Management over the last four years has been successful at maintaining bull:cow ratios at or higher than the management goal of 20 bulls:100 cows.

Since 2011 reductions in antlerless elk hunting opportunity have been implemented in response to population reduction and lower than desired bull numbers in Area 85. The 2013 hunting season was the first attempt in the management history of the Fall Creek elk herd to introduce general license, spikes excluded hunting seasons in response to low yearling bull:100 cow ratio in this area. Spikes excluded seasons were incorporated into the Area 84 management strategy in 2013 to address public concerns that hunting pressure would increase in this area if spikes excluded seasons were not adopted. The 2014 hunt season will be the second consecutive year of spikes excluded hunting seasons.

Harvest Data

Hunter success was estimated at 34% in 2013 with a total harvest over 726 elk. Limited quota license hunters typically account for a much higher success than general licenses hunters. Limited quota license hunters represent at least 40-55% of the total annual antlerless harvest, especially in Hunt Area 84. In 2013, 45% of the antlerless elk were harvested by limited quota license holders. The high harvest success for Type 6 cow/calf license holders is the primary factor which has resulted in the desired population decline in this herd.

The spikes excluded hunt in 2013 resulted in the fewest number of yearling bulls harvested in the Fall Creek herd in at least 22 years. The reduction in yearling harvest achieved the desired result, and addressed concerns regarding the low yearling bulls:100 cows ratio in Area 85.

Population

The population has stabilized within 20% of the objective. The “Time Sensitive Juvenile – Constant Adult Mortality Rate” (TSJ, CA) spreadsheet model was used to derive the post season population estimate. The TSJ, CA model showed the best overall fit compared to the suite of available models (Fit=183, Relative AICc=305). This model tracks bull:cow ratios and, harvest

percentages of antlered elk, and population estimates. Model simulations and derived outcomes fit with observed data collected during postseason herd composition and trend surveys.

During March and April of 2014 approximately 80 elk, primarily calves, died at or near the Camp Creek feedground due to disease and wolf predation. Investigations concluded the presence of Fusobaterium necrophorum from many of the carcasses, the bacterium responsible for foot rot and necrotic stomatitis in elk. Foot rot is a term used for infection of the bacteria when it enters cuts and other openings around the hooves; necrotic stomatitis is the descriptive term for infection of the same bacteria in the mouth. This infectious disease is not uncommon to feedgrounds in west central Wyoming, with occasional outbreaks documented when certain winter and spring conditions increase the prevalence of the disease. *F. necrophorum,* has been linked to elk mortality on the National Elk Refuge as early as the 1920s. The most recent outbreak of note occurred in 2006. This past winter, conditions in western Wyoming likely led to the increased prevalence of the disease, as above average snowfall in February and March, combined with above average temperatures, created some unusually wet conditions. *F. necrophorum* is a naturally-occurring bacteria that thrives in wet, anaerobic environments. Northwestern Wyoming elk were exposed to many freeze/thaw cycles this winter, which formed heavy crusting of snow and areas of sharp, jagged ice and mud. Such conditions can cause lesions to an animal's hoof, or tissues between the toes, allowing the bacteria to enter the animal's system. From there, the bacteria can spread to vital organs, often overwhelming the liver, resulting in death. Calves are typically more susceptible, likely because they have not had a chance to build up immunity to the bacteria like adults.

Hoof rot and necrotic stomatitis are previously observed ailments of elk associated with feedgrounds and often occur at low rates in early spring, prior to the ending of supplemental feeding. The estimated calf loss account for roughly one-quarter of the calves counted on the Camp Creek and Horse Creek feedgrounds this past

Management Summary

The 2014 hunting season is designed to maintain a stable population near the objective. The number of elk counted during the current year's trend count will result in the continuance of general, any elk seasons, with the spikes excluded restriction in order to maintain the opportunity for general license hunters to harvest antlerless elk throughout the herd unit. To achieve these goals, limited quota Type 6 licenses will be reduced from 2013 levels in Area 84, but continue to be valid into November.

In Area 84 the limited quota Type 6 licenses will be valid through November 20. The number of Type 6 licenses will be reduced from 400 to 100 in response to lower numbers of elk being counted on the Horse Creek and Camp Creek feedgrounds, and because of concerns expressed by the public regarding lower elk numbers on these feedgrounds. The Horse Creek drainage was included in the limitations for unused Area 84 and Area 85 Type 6 licenses during the November to January hunt valid only on private property. This management action is an effort to prevent elk from comingling with horses on private property in the Horse Creek drainage. An additional limited quota Type 7 license will be maintained for the second consecutive year; however, the

number of licenses will be increased from 50 to 75 licenses. The opening date for the Type 7 license will be August 15 instead of September 1. This private land hunt will address landowner concerns regarding elk numbers on private property along the Snake River Bottomlands and provide hunters with an extended hunting opportunity to harvest antlerless elk in areas that have been historically prone to chronic elk damage and comingling with livestock.

In Area 85, hunting pressure will be reduced on the antlerless segment of the population by reducing the number of Type 6 cow/calf licenses from 50 to 25 licenses and closing the season October 31. Population management objectives have been achieved in the Area 85 portion of the herd unit, and therefore the appropriate management response is to initiate season limitations that are designed to stabilize this segment of the population that spends the winter on the Dog Creek feedground.

The 2014 hunting seasons are projected to harvest a total of 582 elk. The projected harvest should maintain the population at approximately 4400 elk following the 2014 hunting season.

INPUT	
Species:	Elk
Biologist:	Gary Fralick
Herd Unit & No.:	Fall Creek
Model date:	02/23/14

☑ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	Constant Juvenile & Adult Survival	170480	170489	☐ CJ,CA Model	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	353	487	☐ SCJ,SCA M	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	183	305	☑ TSJ,CA Model	
TSJ,CA,MSC	Time-Specific Juv, Constant Adult Survival, Male survival coefficient	9469	9571	☐ TSJ,CA,MSC Mode	

Population Estimates from Top Model

Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population				Predicted Posthunt Population				Objective
	Field Est	Field SE		Juveniles	Total Males	Females	Total	Juveniles	Total Males	Females	Total	
1993				1647	2083	7453	11183	1558	1591	6918	10066	
1994				2738	2251	7312	12301	2558	1453	6269	10280	
1995				1734	2128	6703	10565	1691	1630	6276	9598	
1996				1990	1972	6385	10347	1858	1577	5928	9362	
1997				1705	1963	6096	9763	1640	1454	5674	8768	
1998				1656	2018	6028	9702	1615	1551	5810	8976	
1999				1406	2054	6100	9560	1304	1541	5725	8570	
2000				1945	1791	5766	9502	1886	1334	5502	8722	
2001				2045	1738	5699	9483	2004	1275	5430	8709	
2002				1590	1712	5660	8963	1546	1392	5316	8254	
2003				2191	1857	5584	9632	2130	1384	5249	8762	
2004				1687	1847	5519	9053	1555	1260	4931	7746	
2005				1802	1936	5423	9160	1754	1446	5143	8343	
2006				1822	1961	5473	9255	1685	1486	5052	8223	
2007				1750	1833	5221	8804	1647	1323	4806	7777	
2008				1613	1669	4978	8260	1486	1227	4488	7201	
2009				1071	1537	4635	7243	971	1093	4025	6089	
2010				1123	1500	4285	6908	878	1020	3436	5334	
2011				934	1386	3681	6002	868	944	3220	5032	
2012				1008	1309	3471	5788	933	838	3090	4860	
2013				1049	1239	3378	5666	970	887	2993	4850	
2014				787	1122	3123	5032	713	825	2854	4392	
2015												
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												

Survival and Initial Population Estimates

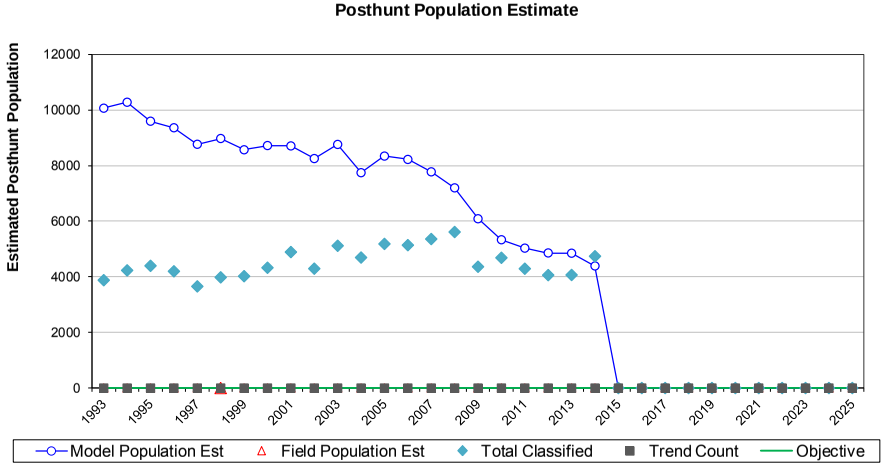
Year	Winter Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.95			0.95		
1994	0.58			0.95		
1995	0.50			0.95		
1996	0.50			0.95		
1997	0.78			0.95		
1998	0.72			0.95		
1999	0.50			0.95		
2000	0.50			0.95		
2001	0.50			0.95		
2002	0.69			0.95		
2003	0.50			0.95		
2004	0.95			0.95		
2005	0.67			0.95		
2006	0.50			0.95		
2007	0.50			0.95		
2008	0.50			0.95		
2009	0.95			0.95		
2010	0.95			0.95		
2011	0.95			0.95		
2012	0.95			0.95		
2013	0.58			0.95		
2014	0.95			0.95		
2015						
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

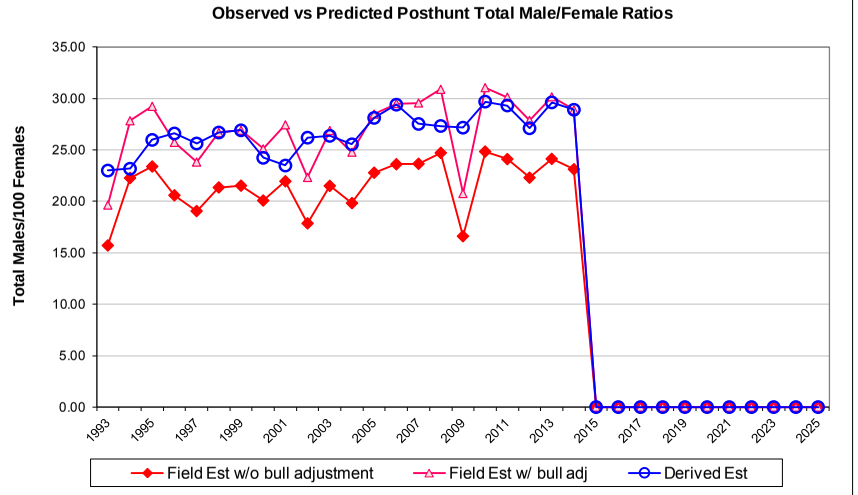
Parameters:	Optim cells
Adult Survival =	0.950
Initial Total Male Pop/10,000 =	0.159
Initial Female Pop/10,000 =	0.692

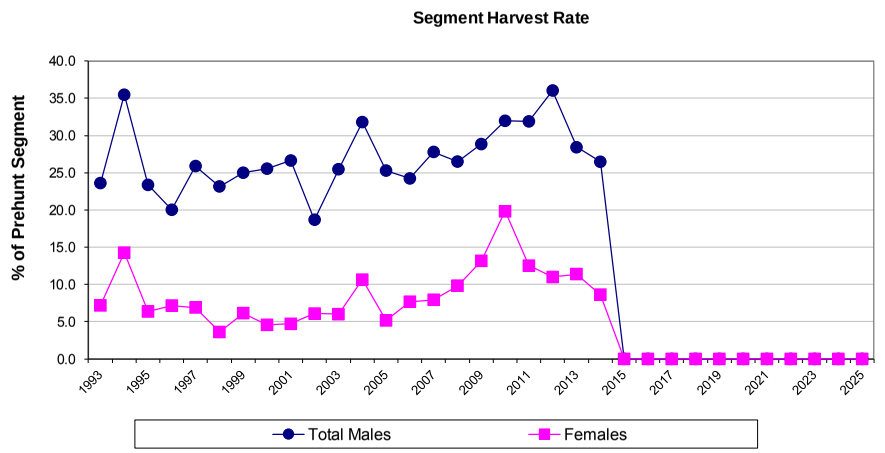
MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Total Bulls Adjustment Factor	80%

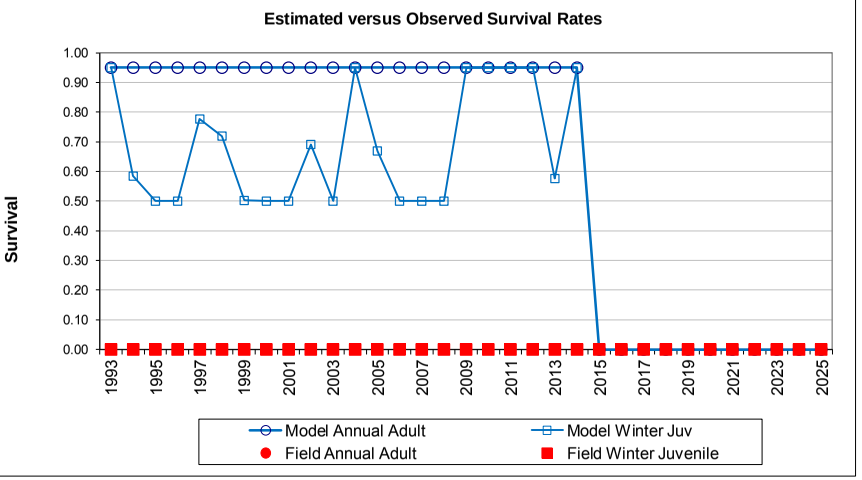
	Classification Counts							Harvest						
Year	Juvenile/Female Ratio			Total Male/Female Ratio									Segment Harvest Rate (% of Prehunt Segment)	
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/ bull adj	Field Est w/o bull adj	Field SE	Juv	Yrl males	2+ Males	Females	Total Harvest	Total Males	Females
1993		22.52	0.99	23.00	19.65	15.72	0.81	81	147	300	487	1015	23.6	7.2
1994		40.81	1.49	23.17	27.84	22.27	1.02	163	241	485	948	1837	35.5	14.3
1995		26.95	1.08	25.98	29.24	23.39	0.99	39	147	305	388	879	23.4	6.4
1996		31.34	1.22	26.60	25.74	20.59	0.95	120	71	288	416	895	20.0	7.2
1997		28.90	1.23	25.63	23.83	19.06	0.96	59	114	348	383	904	25.9	6.9
1998		27.80	1.15	26.70	26.70	21.36	0.99	37	97	328	198	660	23.2	3.6
1999		22.78	1.00	26.91	26.91	21.53	0.97	92	142	325	341	900	25.0	6.1
2000		34.28	1.28	24.24	25.11	20.09	0.93	53	89	327	240	709	25.5	4.6
2001		36.90	1.28	23.49	27.44	21.96	0.93	38	149	272	244	703	26.6	4.7
2002		29.09	1.13	26.19	22.33	17.86	0.85	40	70	221	313	644	18.7	6.1
2003		40.58	1.34	26.37	26.88	21.51	0.91	56	78	352	305	791	25.5	6.0
2004		31.54	1.16	25.55	24.79	19.83	0.88	120	139	395	534	1188	31.8	10.6
2005		34.11	1.18	28.12	28.49	22.79	0.92	43	79	366	255	743	25.3	5.2
2006		33.35	1.17	29.40	29.51	23.61	0.94	124	109	323	382	938	24.2	7.7
2007		34.27	1.16	27.53	29.57	23.66	0.93	94	102	361	377	934	27.8	7.9
2008		33.10	1.11	27.33	30.90	24.72	0.93	116	55	347	445	963	26.5	9.8
2009		24.13	0.98	27.17	20.77	16.61	0.79	91	98	305	555	1049	28.8	13.2
2010		25.55	1.01	29.70	31.06	24.85	1.00	223	86	350	772	1431	32.0	19.8
2011		26.96	1.10	29.32	30.14	24.11	1.03	60	65	337	419	881	31.9	12.5
2012		30.19	1.21	27.11	27.88	22.31	1.01	68	72	357	347	844	36.0	11.0
2013		32.41	1.29	29.62	30.17	24.13	1.07	72	8	312	350	742	28.4	11.4
2014		25.00	0.99	28.91	28.91	23.13	0.94	67	10	260	245	582	26.5	8.6
2015														
2016														
2017														
2018														
2019														
2020														
2021														
2022														
2023														
2024														
2025														

FIGURES

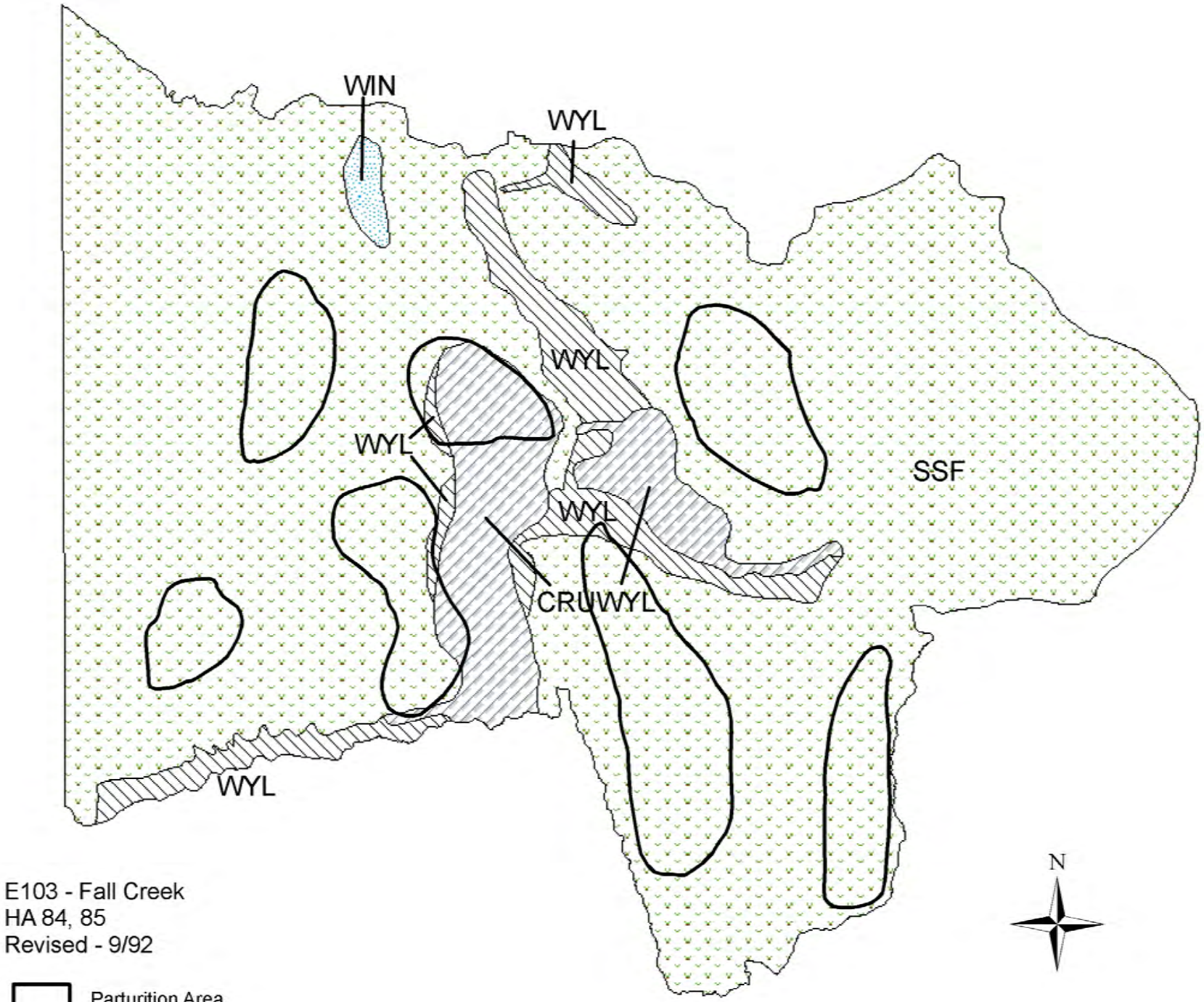








Comments:



E103 - Fall Creek
HA 84, 85
Revised - 9/92

Parturition Area

2013 - JCR Evaluation Form

SPECIES: Elk
HERD: EL105 - AFTON
HUNT AREAS: 88-91

PERIOD: 6/1/2013 - 5/31/2014

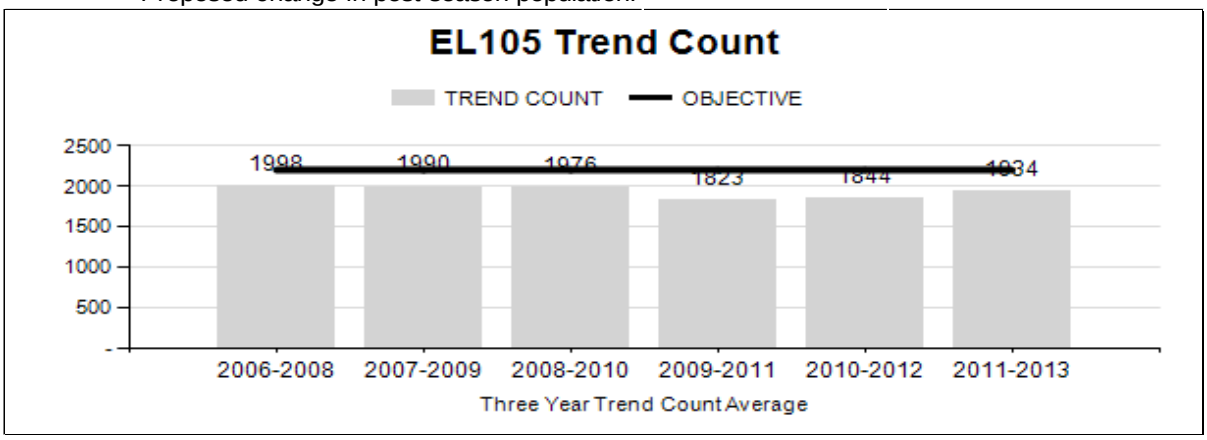
PREPARED BY: GARY FRALICK

	2008 - 2012 Average	2013	2014 Proposed
Trend Count:	1,894	2,260	1,900
Harvest:	725	813	743
Hunters:	2,297	2,445	2,376
Hunter Success:	32%	33%	31%
Active Licenses:	2,371	32%	2,376
Active License Percentage:	31%	32%	31%
Recreation Days:	15,539	15,975	15,009
Days Per Animal:	21.4	19.6	20.2
Males per 100 Females:	22	20	
Juveniles per 100 Females	37	33	

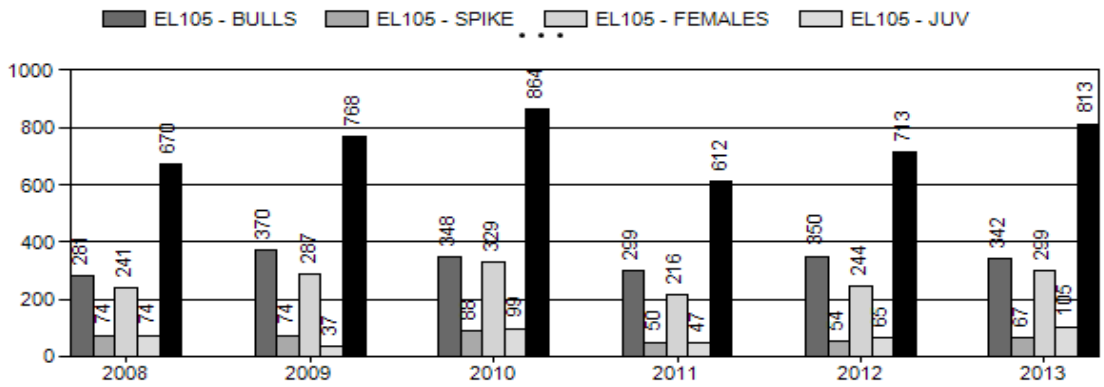
Trend Based Objective (± 20%)	2,200 (1760 - 2640)
Management Strategy:	Recreational
Percent population is above (+) or (-) objective:	3%
Number of years population has been + or - objective in recent trend:	10

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

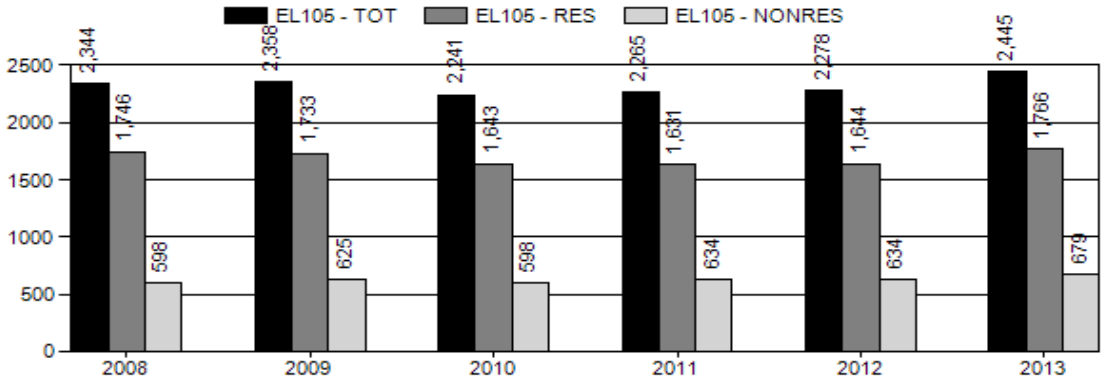
	JCR Year	Proposed
Females ≥ 1 year old:	NA%	NA%
Males ≥ 1 year old:	NA%	NA%
Juveniles (< 1 year old):	NA%	NA%
Total:	NA%	NA%
Proposed change in post-season population:	NA%	NA%



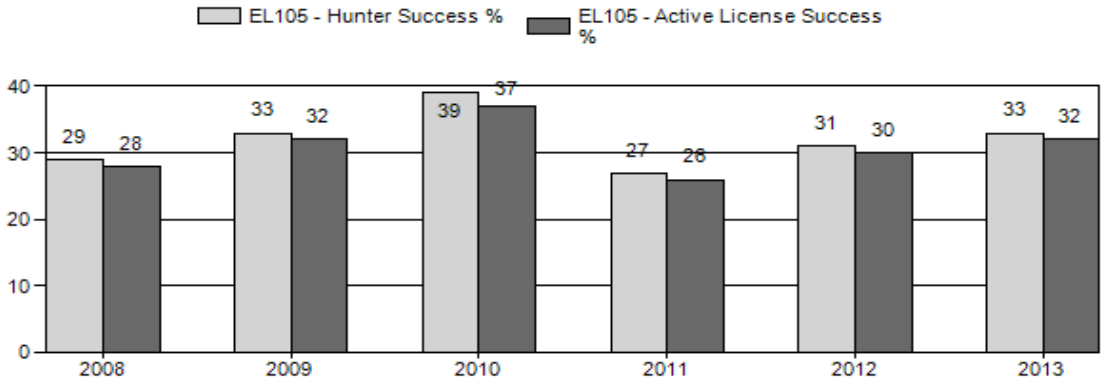
Harvest



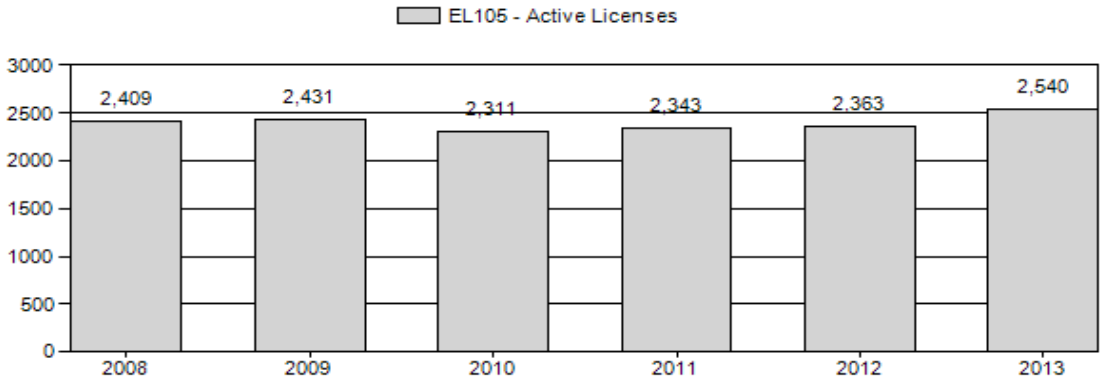
Number of Hunters



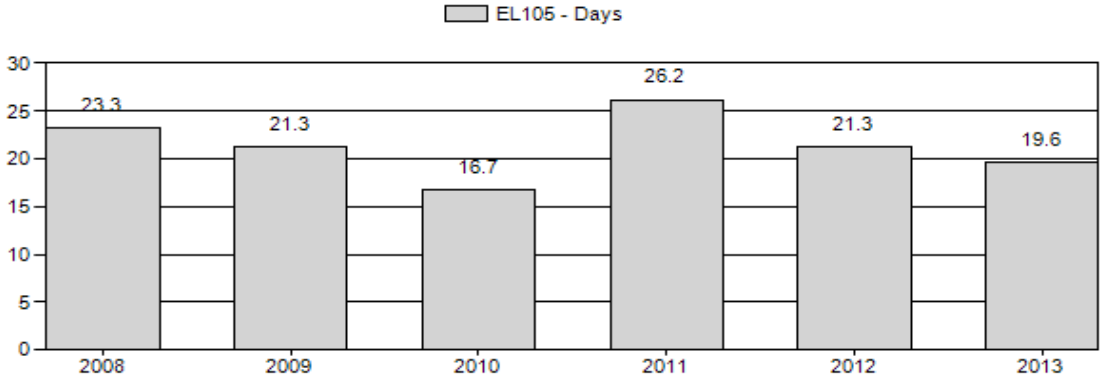
Harvest Success



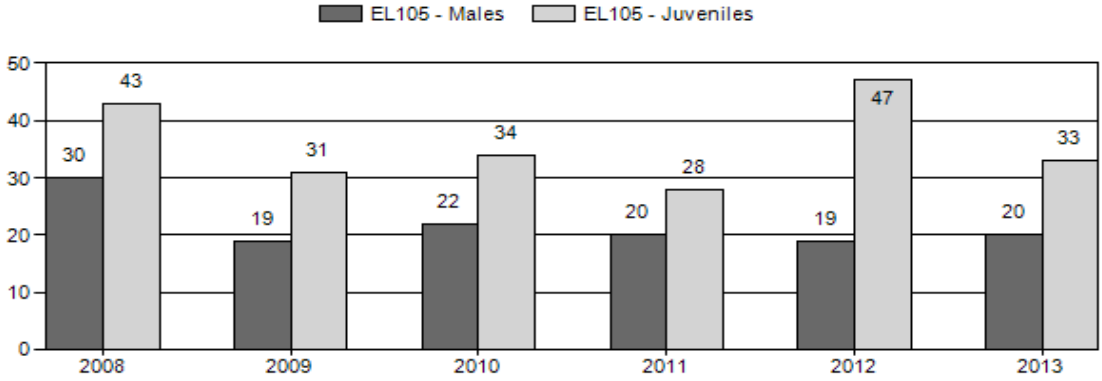
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Elk Herd EL105 - AFTON

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	2,401	136	227	363	17%	1,202	58%	516	25%	2,081	475	11	19	30	± 1	43	± 1	33
2009	2,102	65	163	228	13%	1,196	67%	373	21%	1,797	294	5	14	19	± 1	31	± 1	26
2010	2,280	86	186	272	14%	1,235	64%	426	22%	1,933	0	7	15	22	± 1	34	± 1	28
2011	2,098	53	169	222	13%	1,132	68%	322	19%	1,676	299	5	15	20	± 1	28	± 1	24
2012	2,400	60	145	205	11%	1,077	60%	506	28%	1,788	0	6	13	19	± 1	47	± 2	39
2013	2,400	109	166	275	13%	1,409	66%	461	21%	2,145	0	8	12	20	± 1	33	± 1	27

2014 HUNTING SEASON

SPECIES: ELK **HERD UNIT: AFTON (EL105)**

HUNT AREA	TYPE	OPENS	CLOSES	QUOTA	LIMITATIONS
88		Oct. 1	Oct. 31	40	Limited quota; Any elk – SEE SECTION 6.
89		Oct. 15	Oct. 17		General license; Any elk – SEE SECTION 6.
		Oct. 18	Oct. 24		General license; Antlered elk – SEE SECTION 6.
90		Oct. 15	Oct. 31		General license; Any elk – SEE SECTION 6.
		Nov. 1	Nov. 15		General license; Antlerless elk – SEE SECTION 6.
	6	Oct. 15	Nov. 15	250	Limited quota; Cow or calf – SEE SECTION 6.
91		Oct. 15	Oct. 31		General license; Any elk – SEE SECTION 6.

	1	Oct. 1	Oct. 31	100	Limited quota; Any elk – SEE SECTION 6.
		Nov. 1	Dec. 31		Unused Area 91 Type 1 licenses valid for antlerless elk – SEE SECTION 6.
	6	Nov. 1	Dec. 31	150	Limited quota; Cow or calf – SEE SECTION 6.
		Jan. 1	Jan. 31		Unused Area 91 Type 6 licenses valid in the entire area. Archery only in that portion of Area 91 south of Cedar Creek and east of Muddy String Road (Lincoln County Road 117), north of Lost Creek Road (Lincoln County Road 120) and north of Lost Creek, off national forest. SEE SECTION 6.
88		Sept. 1	Sept. 30		Limited quota; Archery only; SEE SECTION 3.
89, 90		Sept. 1	Sept. 30		General license; Archery only – SEE SECTION 3.
91		Sept. 1	Sept. 30		Archery only ; SEE SECTION 3.

SUMMARY OF CHANGES BY LICENSE NUMBER

Area	**Type**	**Change from 2013**
90	6	+50 cow or calf licenses
91	6	-25 cow or calf licenses and change the limitation wording for clarification.

Management Evaluation
Current Mid-Winter Trend Count Management Objective: 2,200
Management Strategy: Recreational
2013 Mid-Winter Trend Count: 2200
Most Recent 3-Year Running Average Trend Count: 1900

The current mid-winter trend count management objective for Afton elk herd is 2200 elk. The management strategy is recreational management. The objective and management strategy were last revised in 2011. The current mid-winter trend count was 2200 elk.

Herd Unit Issues

Management strategies have been diverse throughout the four hunt areas over the last 10 years in an effort to address individual hunt area issues. Hunting pressure has been maintained in the upper Greys River (Area 90) where elk numbers exceed the Commission-established quota for the Forest Park elk feedground. In the lower Greys River (Area 89) hunting opportunity has been restricted with shorter overall season length and fewer days to harvest antlerless elk than in Area 90. This strategy is designed to increase overall elk numbers on the Greys River feedground and native winter ranges in Area 89. Hunt seasons in the Salt River (Area 91), have maintained elk numbers at desired levels to minimize damage to stored crops and comingling with livestock.

Weather

Weather conditions during the 2013 were extremely dry during the early portion of the summer. By late summer the moisture regime had changed to more frequent precipitation events that persisted into the fall hunting season. Drought conditions in the early portion of the summer abated by late fall as persistent snow storms began to deposit snowpack in the Wyoming and Salt Mountain Ranges. By late winter 2014 snowpack in western Wyoming watersheds were estimated to be well-above normal. Please refer to the following web sites for specific weather station data: http://www.ncdc.noaa.gov/temp-and-precip/time-series and **http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html** .

Habitat

No habitat data has been collected on elk summer and winter ranges. There are no established vegetation transects in this herd unit. Please refer to the 2012 Annual Report Strategic Habitat Plan Accomplishments, pages 61-77 for Jackson Region habitat improvement project summaries **(http://wgfd.wyo.gov/web2011/wildlife-1000708.aspx)**.

Field Data

The Afton elk herd has been managed to maintain the population within +/-20% of the objective of 2200. Population trends are relatively stable. Hunt seasons have been successful at targeting elk numbers, notably in upper Greys River segment of the population, where rapid and sustained

growth has been observed. Hunting seasons have suppressed population growth in an elk herd where moderate to high calf survival and calf:cow ratios are frequently observed at 40 calves:100 cows or higher. Since 2000 bull:cow ratios have met or exceeded the management goal of at least 20 bulls:100 cows in most years.

Harvest Data

Hunter success was estimated at 33% in 2013. Hunt seasons that offer any and antlerless elk hunting opportunities during the October portion of the hunt, and into November, have produced the desired population reduction and stability. These management goals are maintaining the population near the population objective and postseason bull:cow ratios of at least 20 bulls:100 cows.

Population

The population is trending towards stable. Attempts to develop a spreadsheet model have been unsuccessful. Poor alignment of the bull:cow ratios, harvest percentages of males, and population estimates have rendered the development of a spreadsheet model unsuitable. However, on-going efforts to assess population performance were based on annual trend counts conducted since 2007. Trend counts appear to present a more reasonable depiction of this population's performance, which has averaged approximately 1800 elk over the last three years.

Management Summary

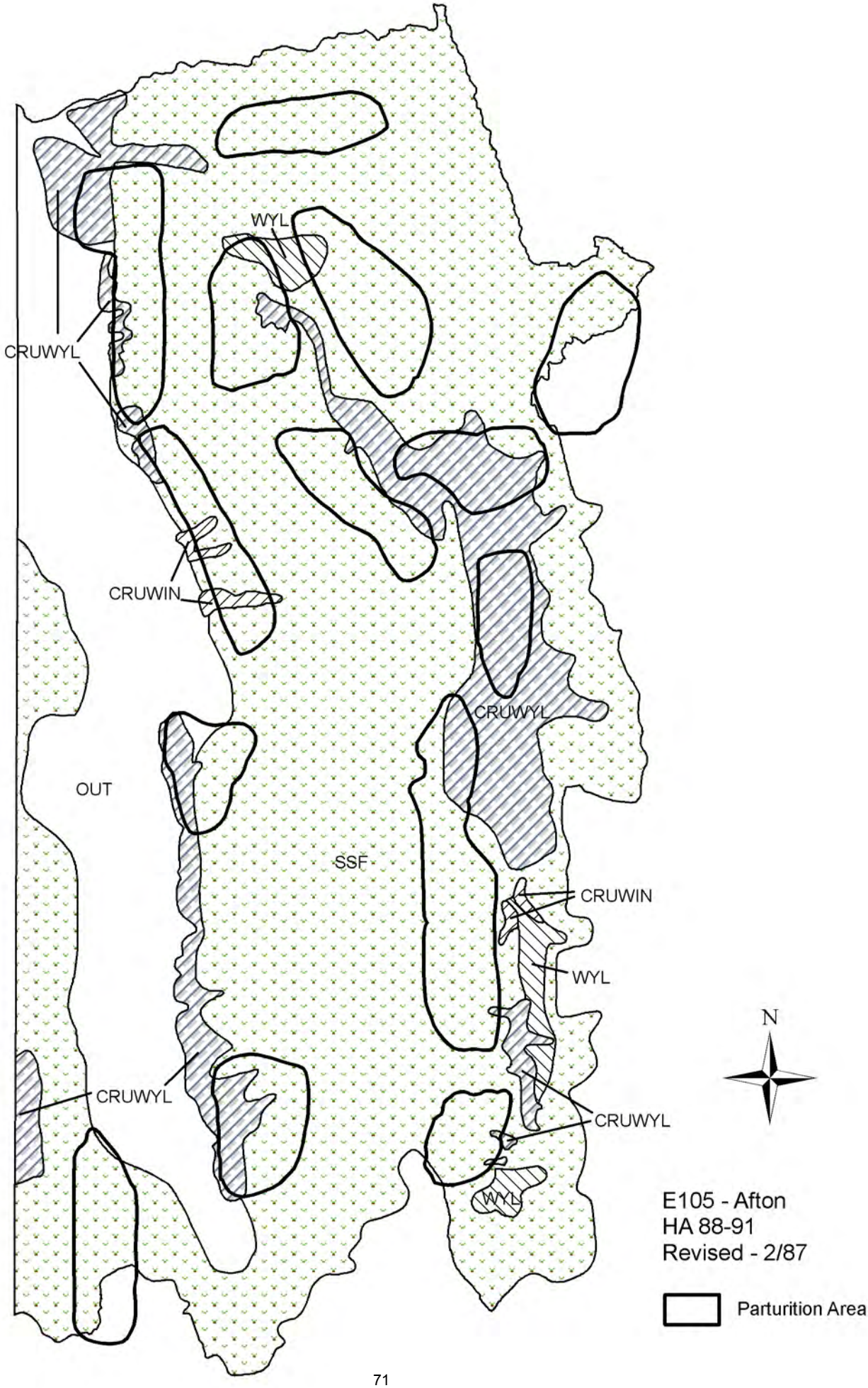
The 2014 hunting season is designed to maintain the mid-winter trend count management objective. The lower Greys River (HA 89) will close at least one week earlier than the typical October 31 closure. The earlier closure in Area 89 is designed to reduce harvest of antlered elk in order to recruit more bulls into the posthunt population, and increase overall antlered elk numbers in the lower Greys River. By shortening the hunting season in Area 89 the effect is to encourage hunters to shift their efforts to Area 90 where elk numbers have been difficult to reduce. The additional hunting pressure that is anticipated in Area 90 may result in increased antlerless elk harvest in the upper Greys River. In addition, a total of three (3) days of any elk hunting will occur in Area 89 in an effort to boost overall elk numbers on the Greys River feedground, and reduce early season hunting pressure on antlered elk. Elk numbers on this feedground have been below the Commission-established quota for 17 consecutive years.

Management will continue to emphasize antlerless elk harvest in Area 90 by enabling general and limited quota type 6 license holders to hunt into November. The Area 90 Type 6 additional cow or calf licenses will increase from 200 to 250 licenses in an effort to increase harvest. The season length for limited quota Type 6 licenses will extend into November as it has since 2006 in an effort to encourage hunters to harvest antlerless elk in an area where the Forest Park feedground quota has exceeded the Commission-established quota.

In Area 91 the number of Type 6 cow or calf only licenses will decrease from 175 to 150 licenses in response to fewer elk being observed on native winter ranges, and decrease in elk

damage concerns along the eastern portion of area 91. Season dates for this license will continue to extend through the end of January.

Based on past harvest statistics, the 2014 hunting seasons will result in a harvest of 740 elk. The 2014 harvest should maintain the population within +/- 20% of the annual three-year trend count average of 1800 following the 2014 hunting season.


WYL
CRUWYL
CRUWIN
CRUWYL
OUT
SSF
CRUWIN
WYL
CRUWYL
CRUWYL
WYL
N
E105 - Afton
HA 88-91
Revised - 2/87
Parturition Area

2013 - JCR Evaluation Form

Species: Moose

Period: 6/1/2013 - 5/31/2014

Herd: MO101 - TARGHEE

Hunt Areas: 16, 37, 900

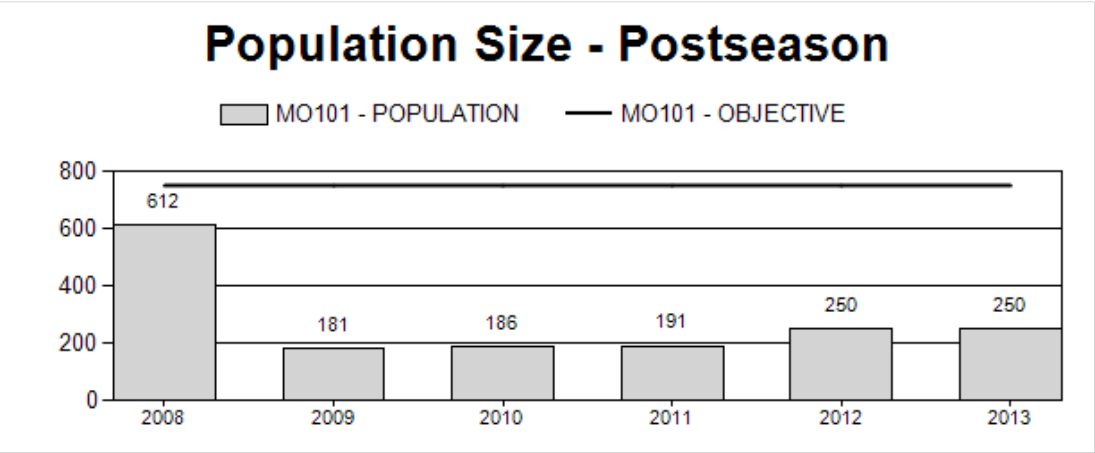
Prepared By: ALYSON COURTEMANCH

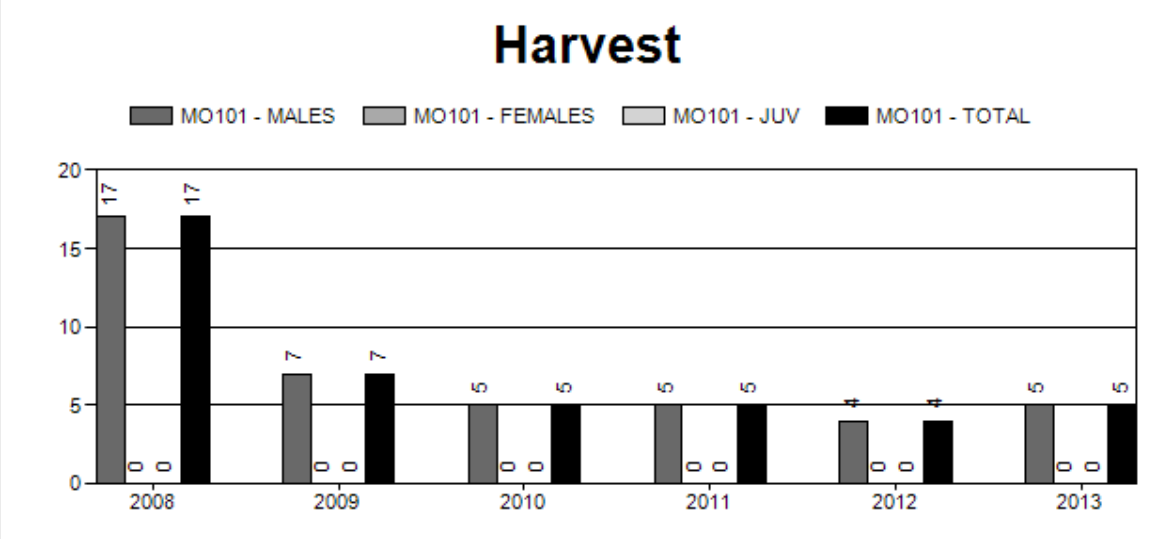
	2008 - 2012 Average	2013	2014 Proposed
Population:	284	250	250
Harvest:	8	5	4
Hunters:	11	5	5
Hunter Success:	73%	100%	100 %
Active Licenses:	11	5	5
Active License Percent:	73%	100%	100 %
Recreation Days:	95	24	40
Days Per Animal:	11.9	4.8	10
Males per 100 Females	85	0	
Juveniles per 100 Females	31	0	

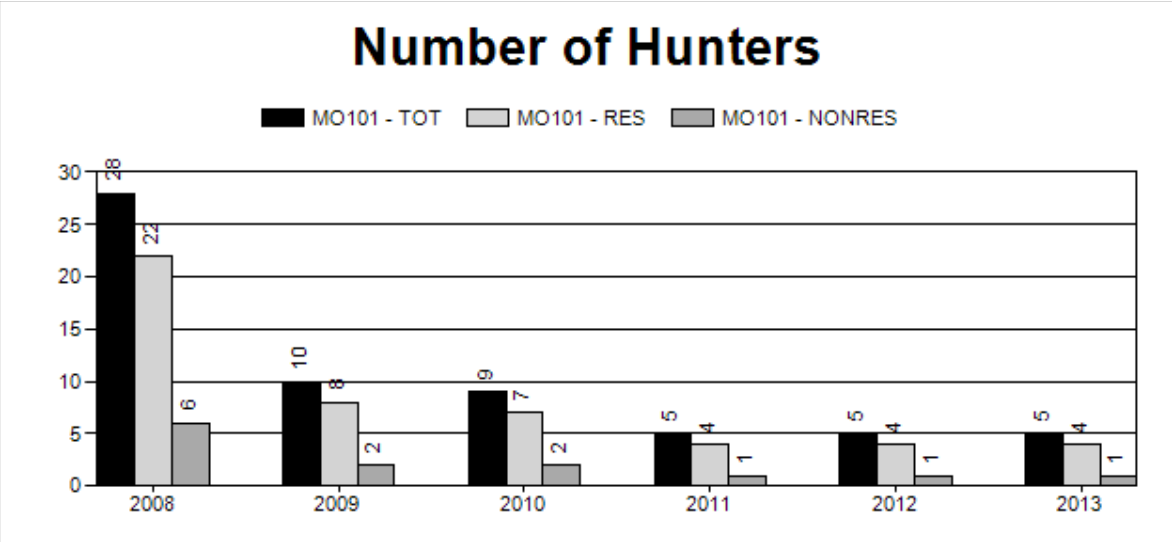
Population Objective:	750
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-66.7%
Number of years population has been + or - objective in recent trend:	0
Model Date:	None

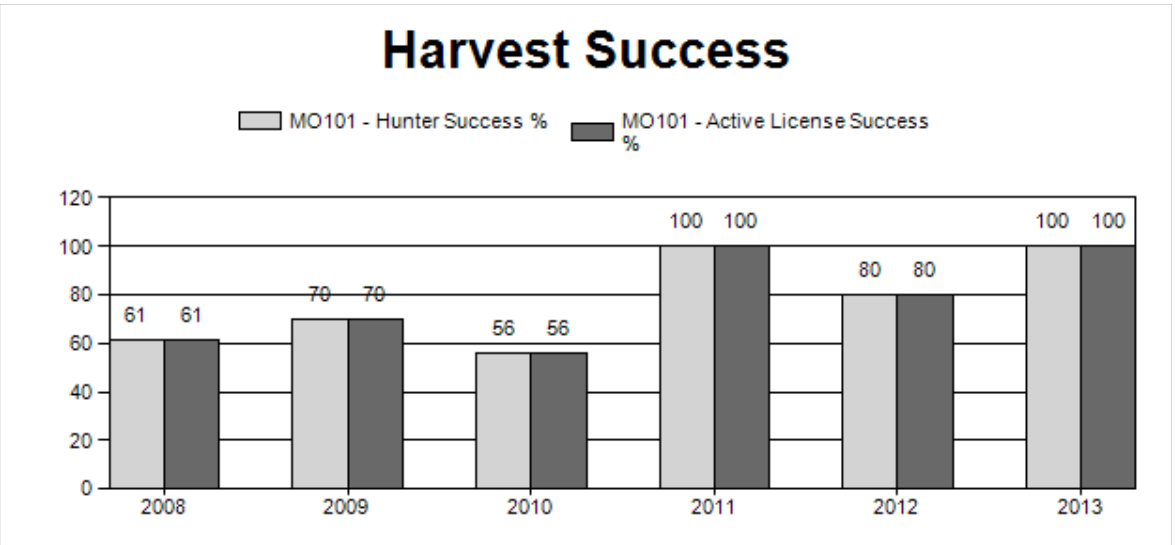
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

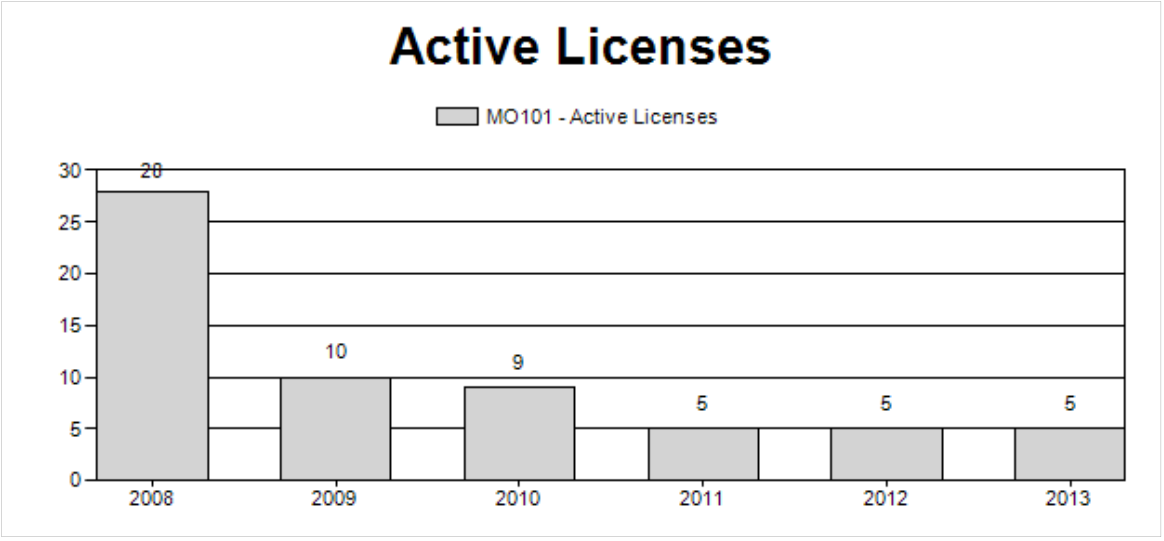
	JCR Year	Proposed
Females ≥ 1 year old:	na%	na%
Males ≥ 1 year old:	na%	na%
Juveniles (< 1 year old):	na%	na%
Total:	na%	na%
Proposed change in post-season population:	na%	na%

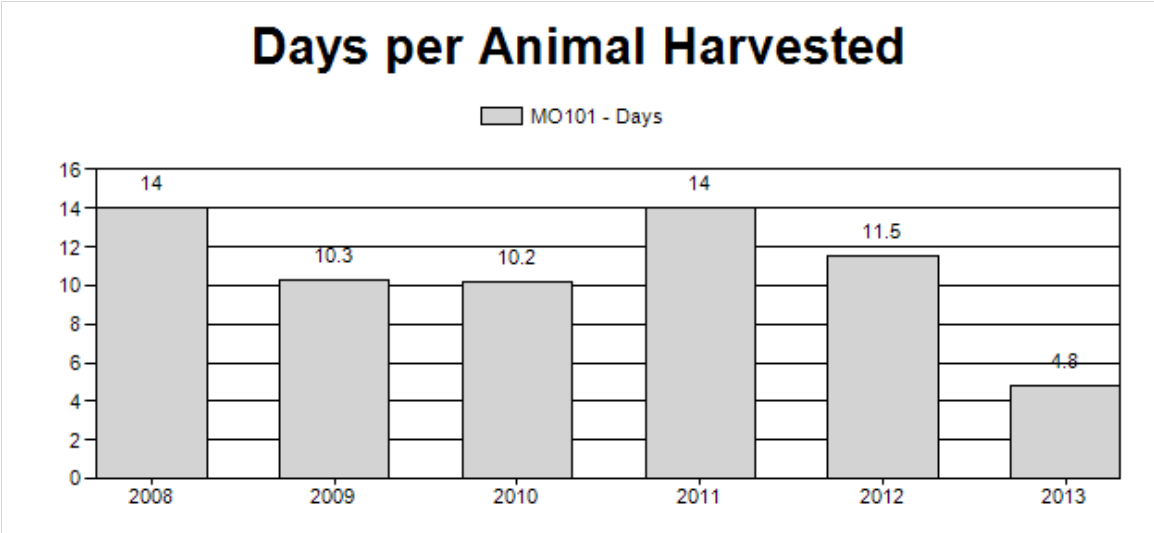


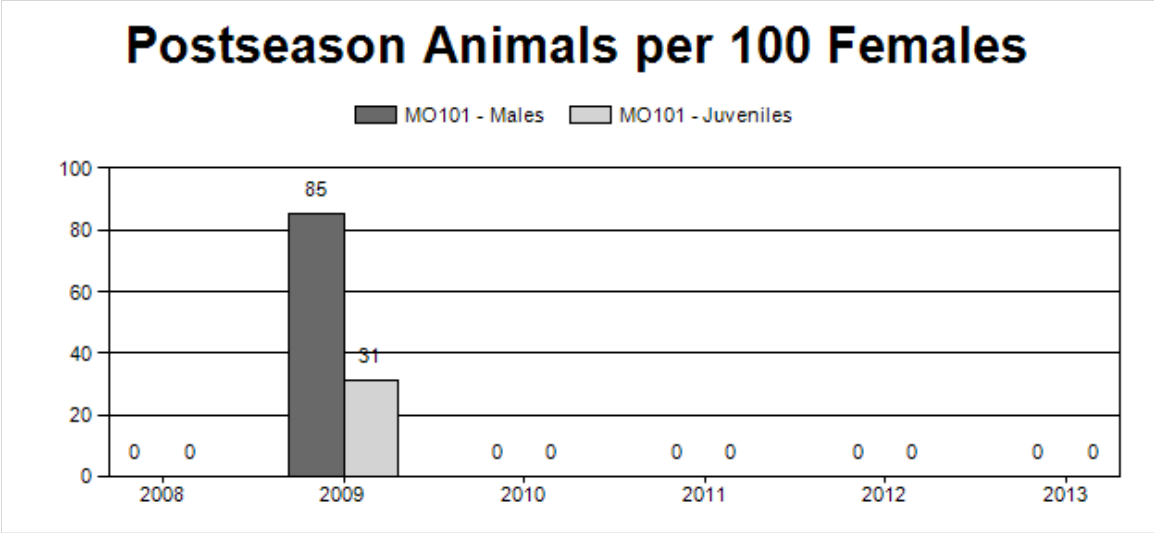

Harvest
MO101 - MALES
MO101 - FEMALES
MO101 - JUV
MO101 - TOTAL
20
15
10
5
0
17
0
0
17
7
0
0
7
5
0
0
5
5
0
0
5
4
0
0
4
5
0
0
5
2008
2009
2010
2011
2012
2013

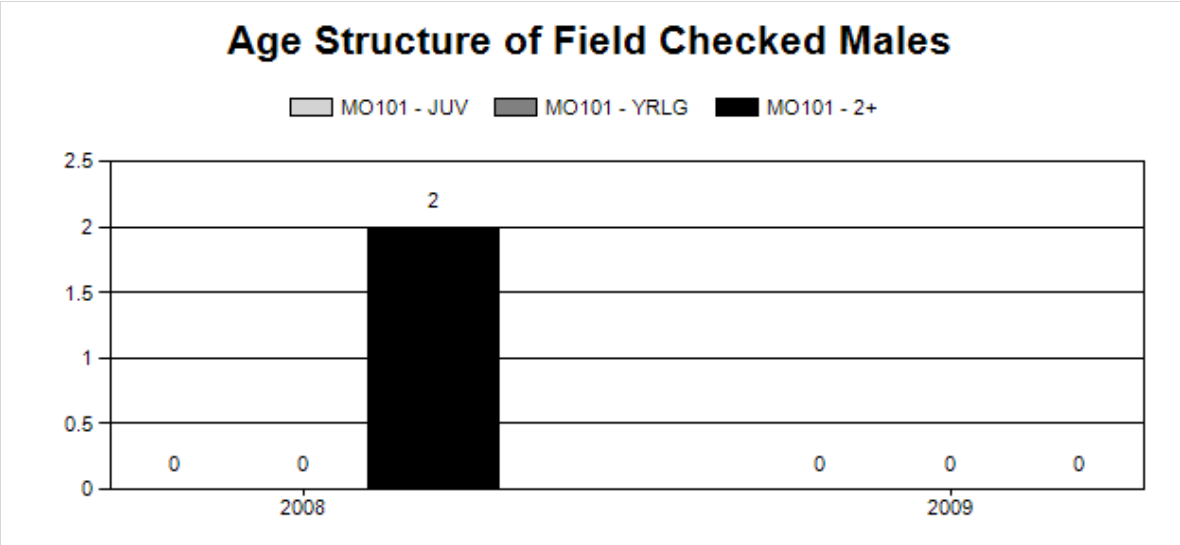

Number of Hunters
MO101 - TOT
MO101 - RES
MO101 - NONRES
30
25
20
15
10
5
0
28
22
6
10
8
2
9
7
2
5
4
1
5
4
1
5
4
1
2008
2009
2010
2011
2012
2013

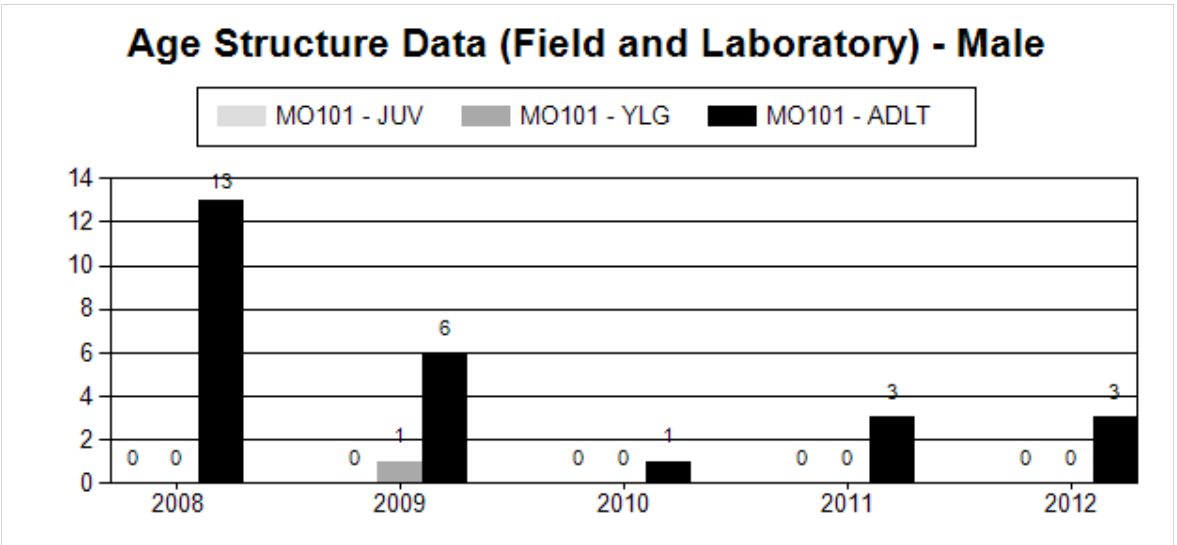

Harvest Success
MO101 - Hunter Success %
MO101 - Active License Success %
120
100
80
60
40
20
0
61
61
70
70
56
56
100
100
80
80
100
100
2008
2009
2010
2011
2012
2013

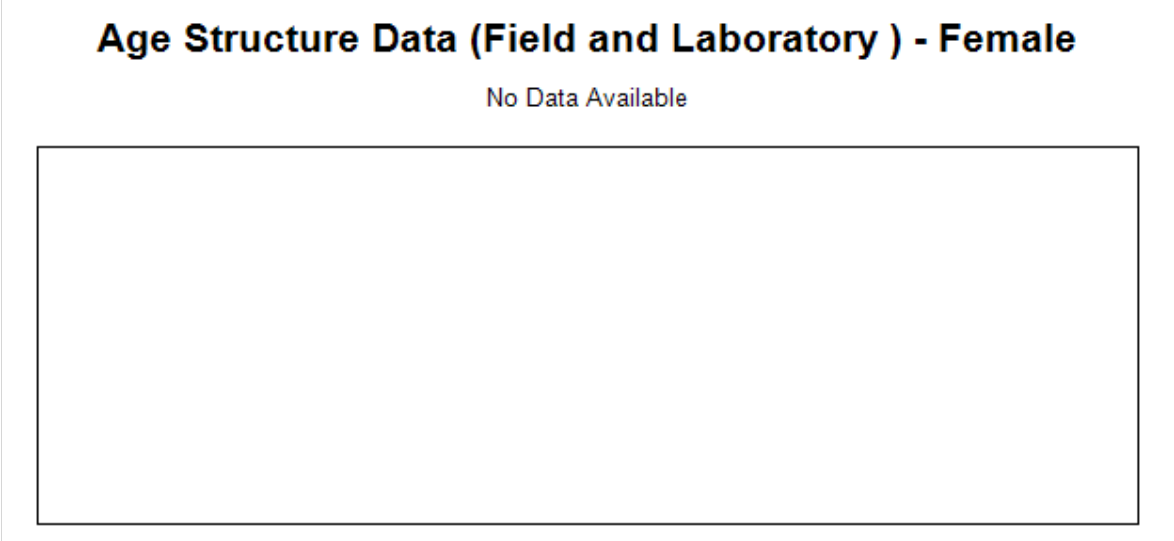

Active Licenses
MO101 - Active Licenses
30
25
20
15
10
5
0
28
10
9
5
5
5
2008
2009
2010
2011
2012
2013


Days per Animal Harvested
MO101 - Days
16
14
12
10
8
6
4
2
0
14
10.3
10.2
14
11.5
4.8
2008
2009
2010
2011
2012
2013


Postseason Animals per 100 Females
MO101 - Males
MO101 - Juveniles
100
80
60
40
20
0
85
31
0 0
0 0
0 0
0 0
0 0
2008
2009
2010
2011
2012
2013


Age Structure of Field Checked Males
MO101 - JUV
MO101 - YRLG
MO101 - 2+
2.5
2
1.5
1
0.5
0
0
0
2
0
0
0
2008
2009


Age Structure Data (Field and Laboratory) - Male
MO101 - JUV
MO101 - YLG
MO101 - ADLT
14
12
10
8
6
4
2
0
0 0 13
0 1 6
0 0 1
0 0 3
0 0 3
2008
2009
2010
2011
2012


Age Structure Data (Field and Laboratory) - Female
No Data Available

2008 - 2013 Postseason Classification Summary

for Moose Herd MO101 - TARGHEE

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	612	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2009	181	0	0	57	39%	67	46%	21	14%	145	168	0	0	85	± 0	31	± 0	17
2010	186	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2011	191	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2012	250	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2013	250	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0

2014 HUNTING SEASONS
TARGHEE MOOSE HERD (MO101)

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
16, 37	1	Sep. 15	Nov. 5	5	Limited quota	Antlered moose

Special Archery Seasons

Hunt Area	Dates of Seasons	
	Opens	Closes
16, 37	Sep. 1	Sep. 14

Summary of 2014 License Changes

Hunt Area	Type	Changes from 2013
16, 37	1	-5 days
		+5 days for archery season

<u>Management Evaluation</u>
Current Postseason Population Management Objective: 750
Management Strategy: Special
2013 Postseason Population Estimate: ~150
2014 Proposed Postseason Population Estimate: ~150

The management objective for the Targhee Moose Herd Unit is 750 moose. Spreadsheet models developed for this moose herd do not appear to adequately simulate observed trends and therefore managers will develop alternative objectives for this herd in 2014.

Herd Unit Issues

The current objective is based on a POPII simulation that overestimates the population of moose along the Wyoming-Idaho state line. This population is likely below the post season management objective based on field observations of moose along the state line. Post-season classification surveys are not flown in this herd due to budget constraints.

Weather

Following an extremely dry summer and fall in 2012, weather conditions in 2013 were considerably wetter. The area received significant pulses of spring and fall moisture, which improved forage conditions for elk and other big game. Winter precipitation was reported at 109% of normal by mid-February 2014. Please refer to the following web sites for specific weather station data. **http://www.ncdc.noaa.gov/temp-and-precip/time-series** and **http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html**

Habitat

No habitat data has been collected on mule deer summer and winter ranges in recent years. There are several historical vegetation transects that have not been monitored in the past 5 years. Several habitat improvement projects are being implemented in this herd unit, including the Hill Creek Prescribed Burn, which is scheduled for completion in 2014. This project will improve conifer-encroached aspen stands in the foothills of the Teton Range. In addition, a habitat treatment in Teton Canyon is currently in the planning stages to improve mountain shrub and aspen communities for moose. Please refer to the 2013 Annual Report Strategic Habitat Plan Accomplishments for Jackson Region habitat improvement project summaries (**http://wgfd.wyo.gov/web2011/wildlife-1000708.aspx**).

Field Data

There was no field data collected in the Targhee Herd Unit during the 2013 biological year.

Harvest Data

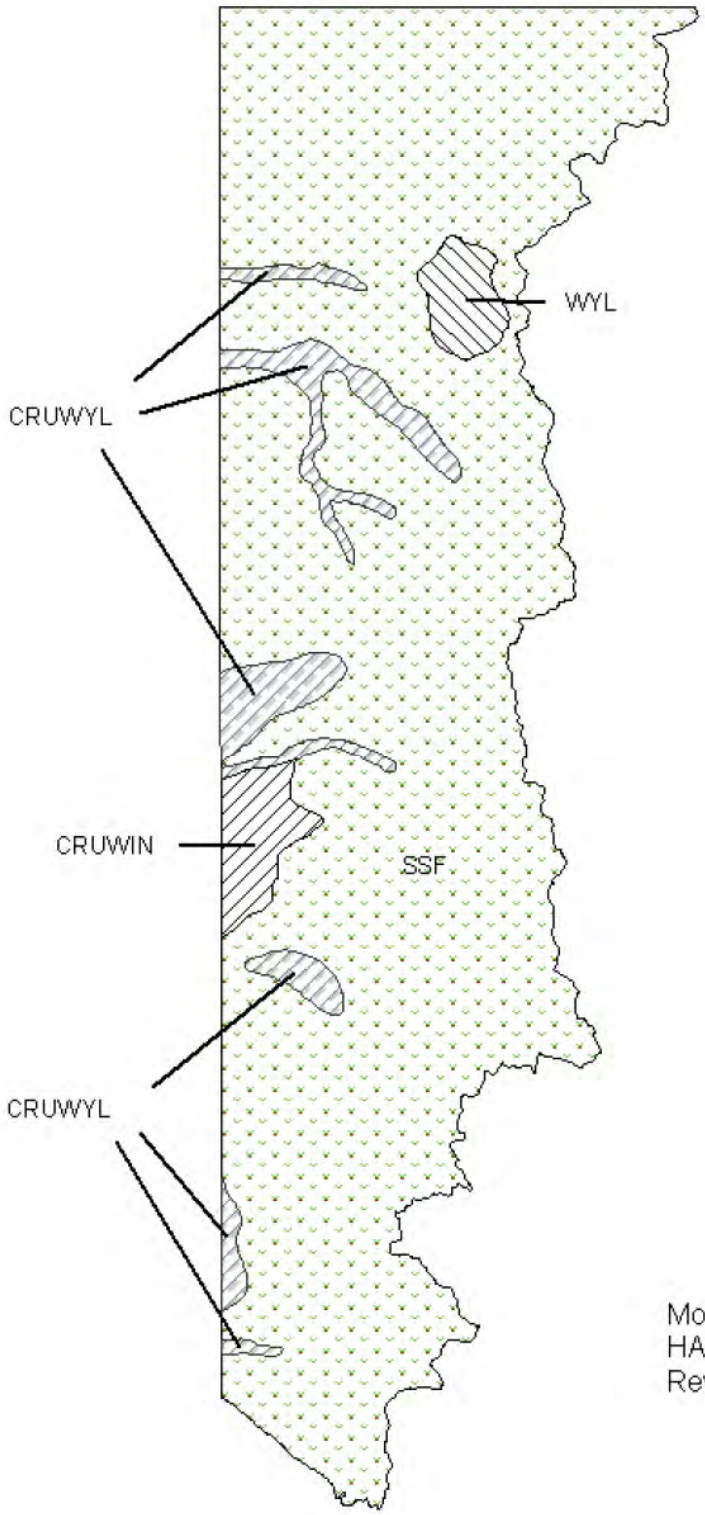
To offset observed population declines, antlerless harvest was eliminated from the Targhee moose herd in 2006 and the two hunt areas were combined in 2011. In spite of these changes the moose population does not appear to be increasing. Data from the 2013 harvest survey indicate that 5 hunters harvested 5 bulls. Harvest success has been consistently high for past 3 years. The average number of days to harvest was relatively low in 2013 at 4.8 days compared to 11.5 days in 2012 and 14 days in 2011. However, the low sample size makes a meaningful analysis difficult.

Population

Due to budget constraints there have been no mid-winter surveys in the Targhee herd since 2009. Based on the 2009 survey this population is below the post season management objective. Similar to the Jackson moose herd this population appeared to decline during the early 2000s.

Management Summary

Due to the “interstate” nature of this population, managing this herd is difficult. Moose along the state line spend summer and early fall in Wyoming and winter along drainages in the foothills of the Teton Range. The population has not responded to hunting season changes and it is likely that numerous factors are influencing recruitment and survival of moose in this population. Managers plan to maintain limited hunting opportunity west of the Teton Range until harvest statistics and field observations warrant additional review.



Moose (M101) - Targhee
HA 16,37
Revised 7/87

2013 - JCR Evaluation Form

SPECIES: Moose

PERIOD: 6/1/2013 - 5/31/2014

HERD: MO103 - JACKSON

HUNT AREAS: 7, 14-15, 17-19, 28, 32, 777, 888

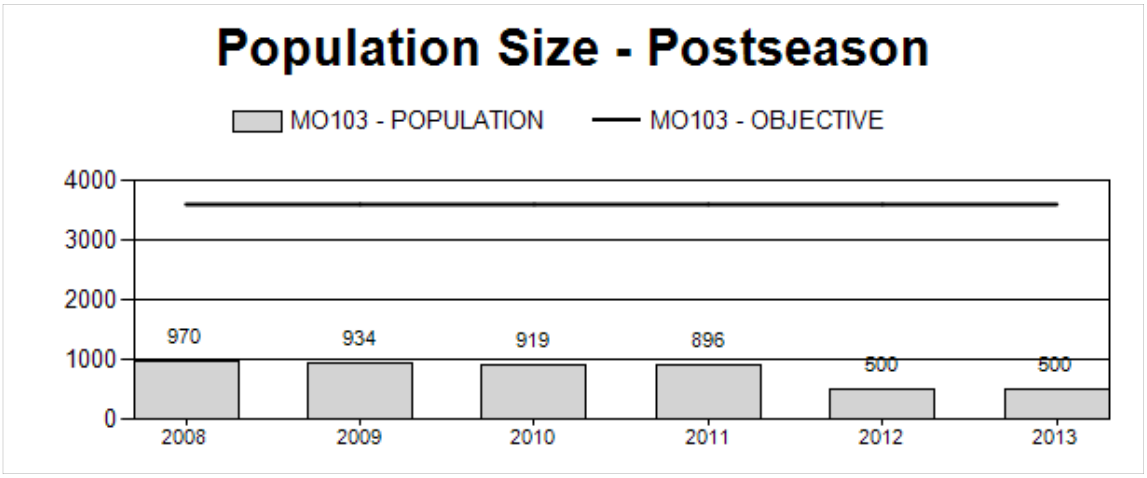
PREPARED BY: ALYSON COURTEMANCH

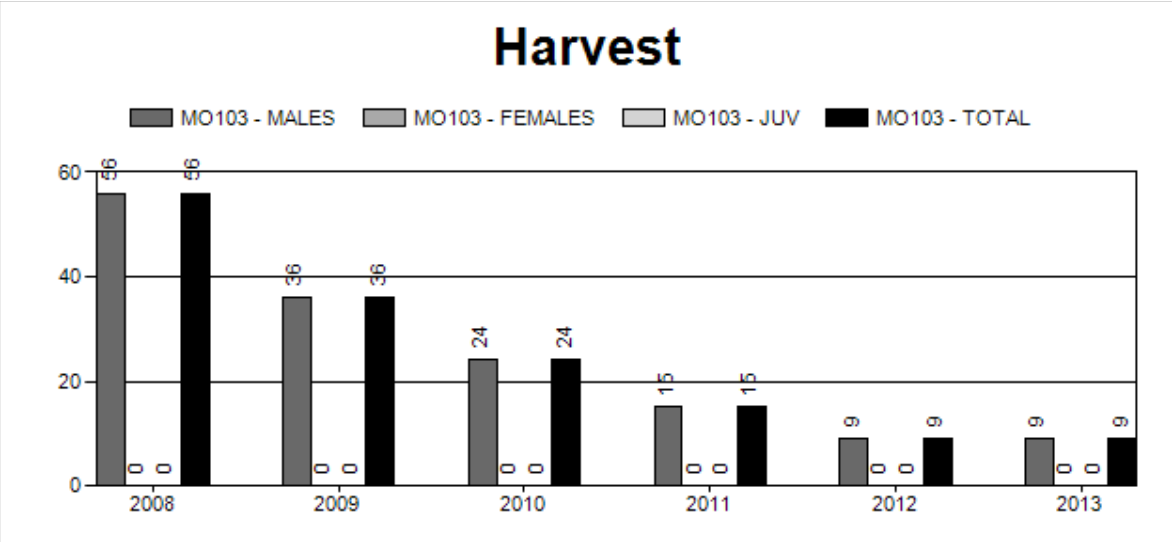
	2008 - 2012 Average	2013	2014 Proposed
Population:	844	500	500
Harvest:	28	9	10
Hunters:	34	9	10
Hunter Success:	82%	100%	100%
Active Licenses:	34	9	10
Active License Percent:	82%	100%	100%
Recreation Days:	252	39	60
Days Per Animal:	9	4.3	6
Males per 100 Females	69	89	
Juveniles per 100 Females	23	37	

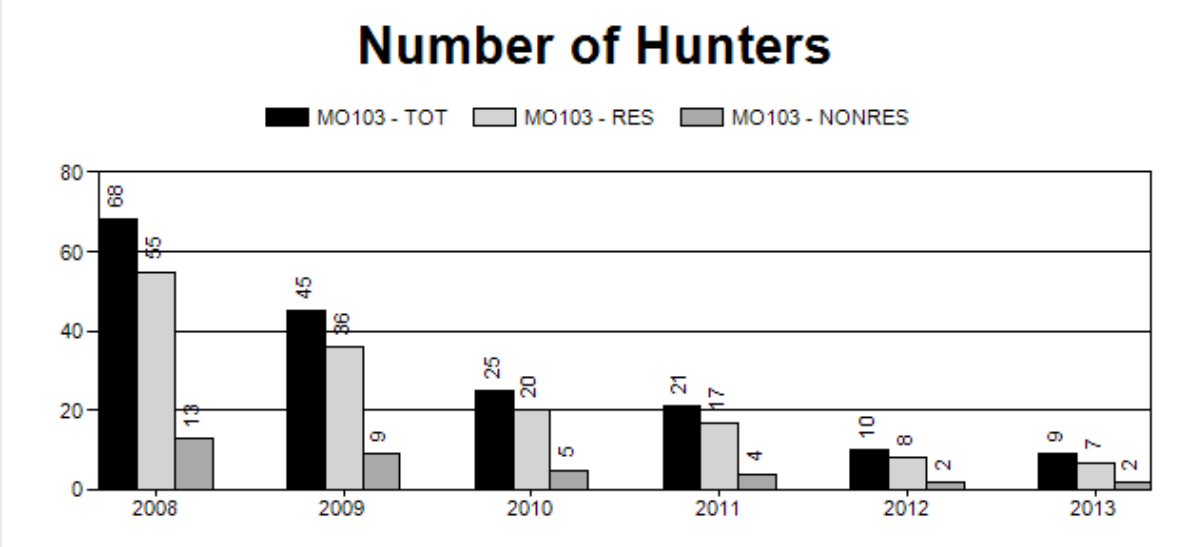
Population Objective:	3,600
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-86.1%
Number of years population has been + or - objective in recent trend:	0
Model Date:	None

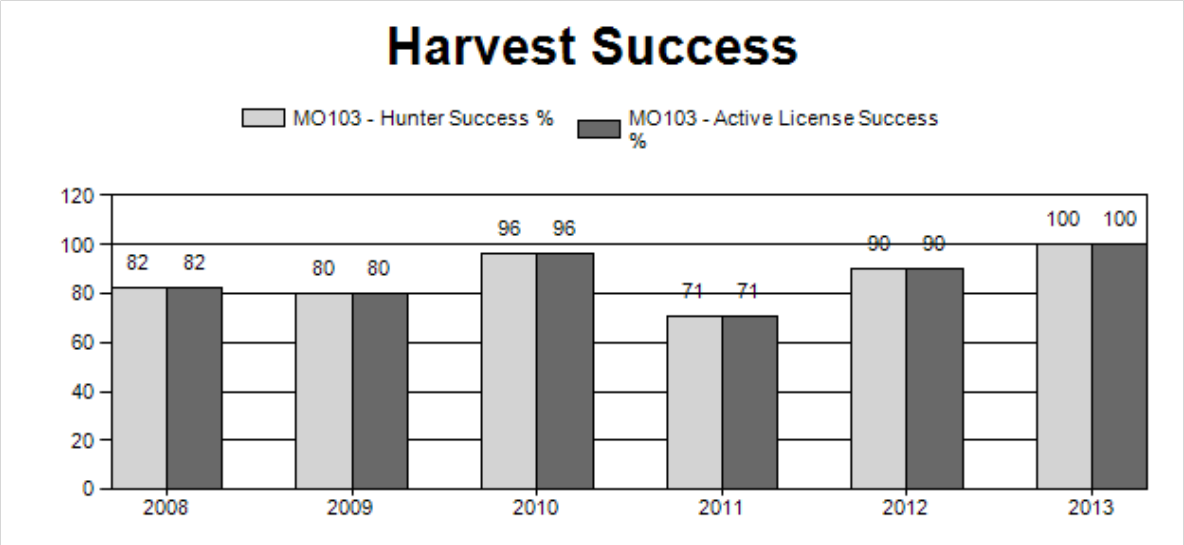
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

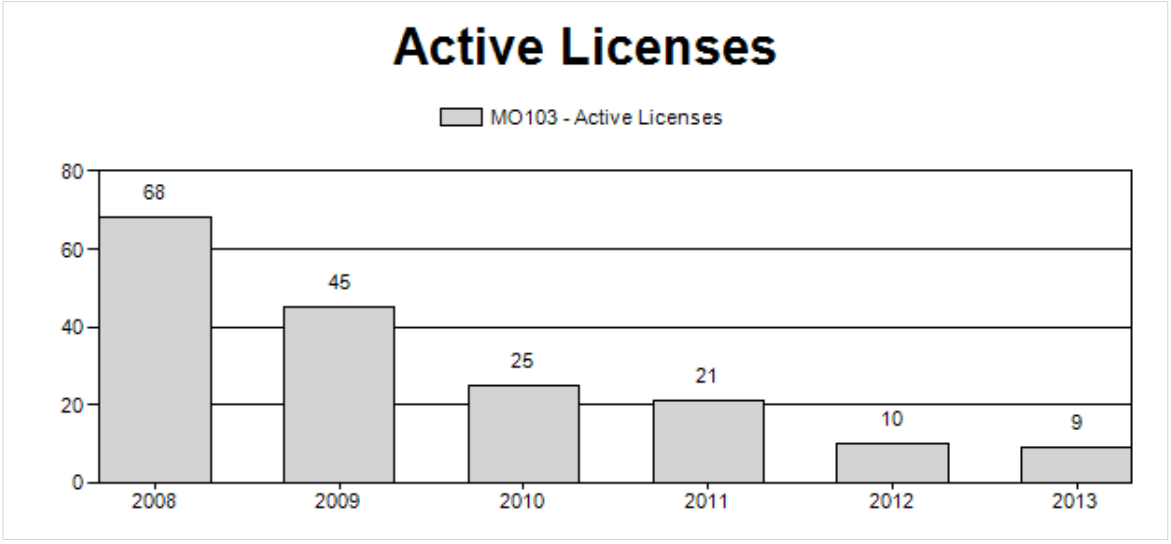
	JCR Year	Proposed
Females ≥ 1 year old:	na%	na%
Males ≥ 1 year old:	na%	na%
Juveniles (< 1 year old):	na%	na%
Total:	na%	na%
Proposed change in post-season population:	na%	na%

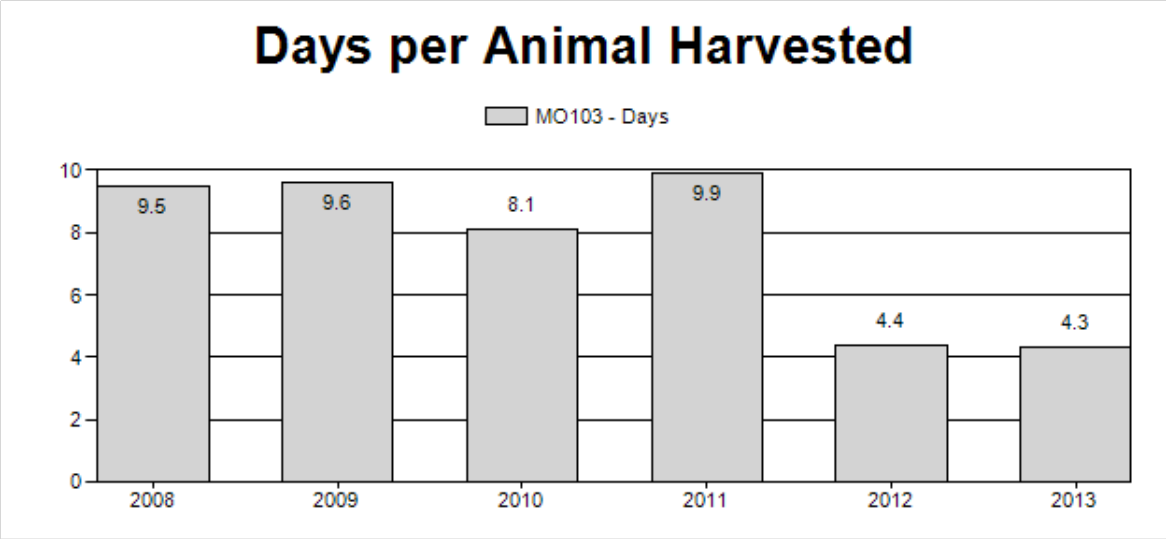


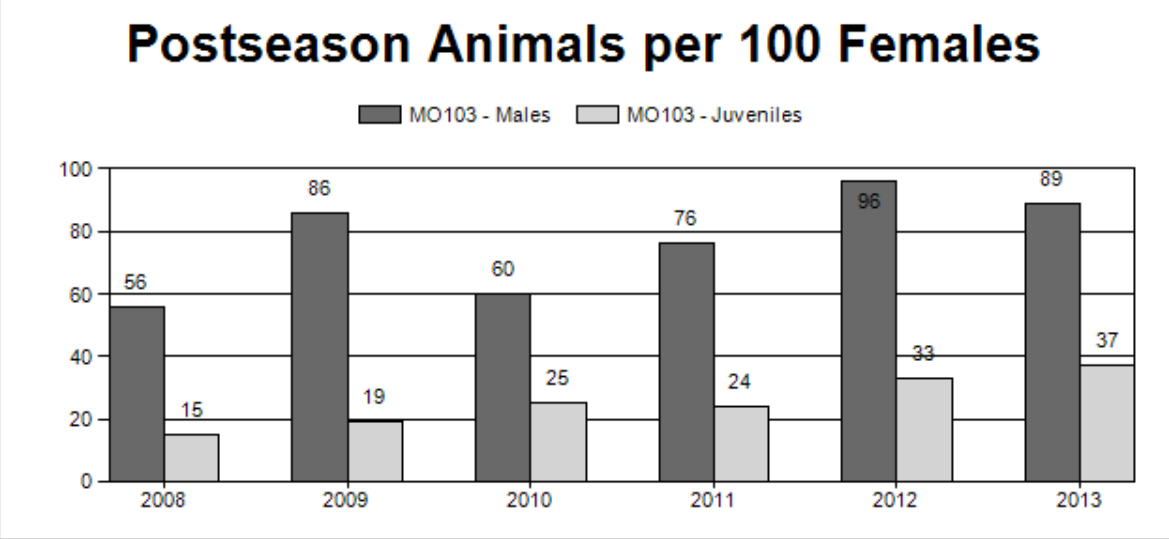

Harvest
MO103 - MALES
MO103 - FEMALES
MO103 - JUV
MO103 - TOTAL
60
40
20
0
56
0
0
56
36
0
0
36
24
0
0
24
15
0
0
15
9
0
0
9
9
0
0
9
2008
2009
2010
2011
2012
2013

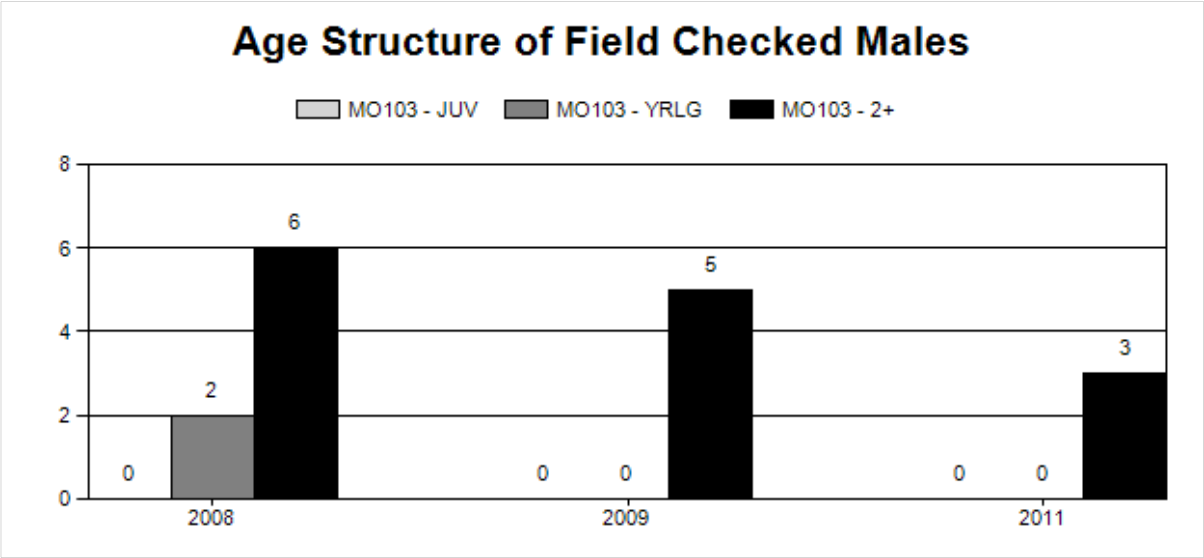

Number of Hunters
MO103 - TOT
MO103 - RES
MO103 - NONRES
80
60
40
20
0
68
55
13
45
36
9
25
20
5
21
17
4
10
8
2
9
7
2
2008
2009
2010
2011
2012
2013

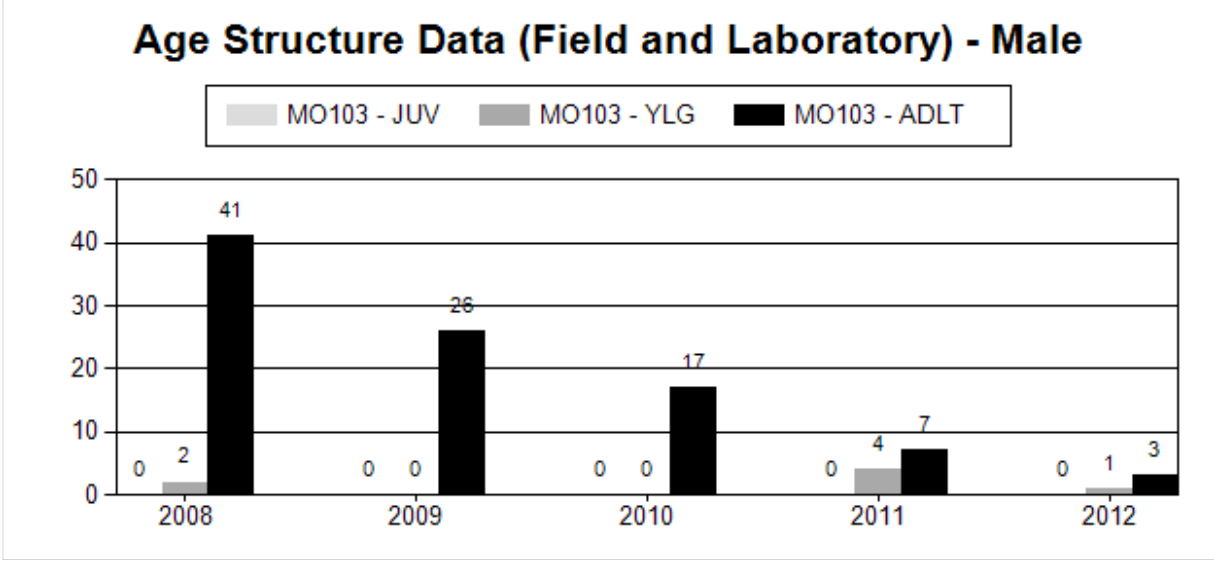

Harvest Success
MO103 - Hunter Success %
MO103 - Active License Success %
120
100
80
60
40
20
0
82
82
80
80
96
96
71
71
90
90
100
100
2008
2009
2010
2011
2012
2013

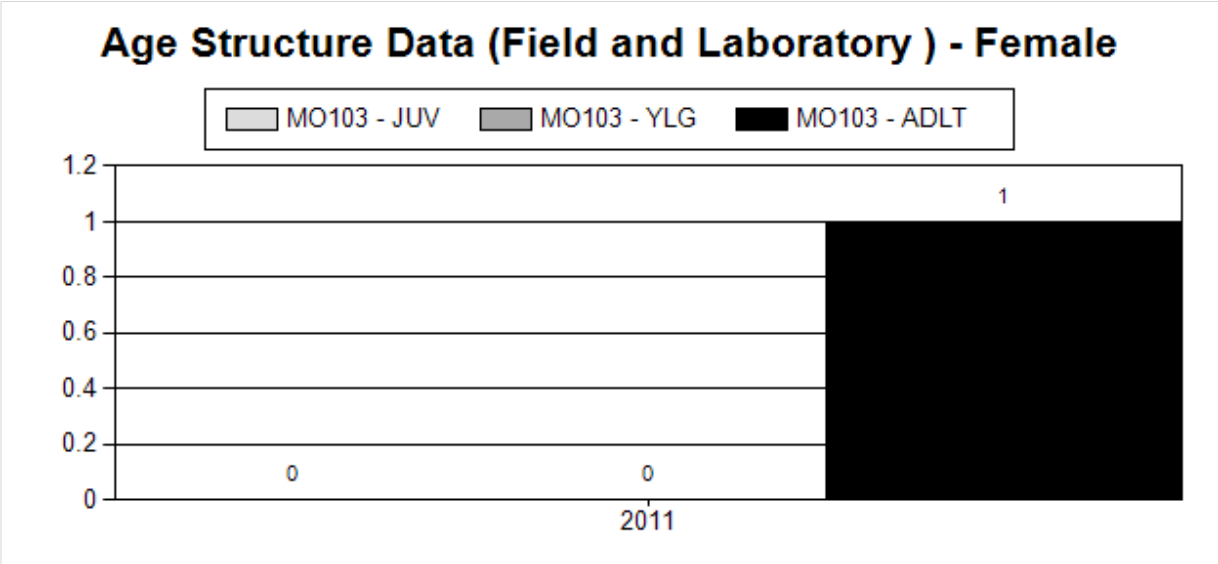

Active Licenses
MO103 - Active Licenses
80
60
40
20
0
68
45
25
21
10
9
2008
2009
2010
2011
2012
2013


Days per Animal Harvested
MO103 - Days
10
8
6
4
2
0
9.5
9.6
8.1
9.9
4.4
4.3
2008
2009
2010
2011
2012
2013


Postseason Animals per 100 Females
MO103 - Males
MO103 - Juveniles
100
80
60
40
20
0
56
15
86
19
60
25
76
24
96
33
89
37
2008
2009
2010
2011
2012
2013


Age Structure of Field Checked Males
MO103 - JUV
MO103 - YRLG
MO103 - 2+
8
6
4
2
0
0
2
6
0
0
5
0
0
3
2008
2009
2011


Age Structure Data (Field and Laboratory) - Male
MO103 - JUV
MO103 - YLG
MO103 - ADLT
50
40
30
20
10
0
0
2
41
0
0
26
0
0
17
0
4
7
0
1
3
2008
2009
2010
2011
2012


Age Structure Data (Field and Laboratory) - Female
MO103 - JUV
MO103 - YLG
MO103 - ADLT
1.2
1
0.8
0.6
0.4
0.2
0
0
0
1
2011

2008 - 2013 Postseason Classification Summary

for Moose Herd MO103 - JACKSON

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	970	0	0	116	33%	208	58%	32	9%	356	502	0	0	56	± 7	15	± 3	10
2009	934	0	0	49	42%	57	49%	11	9%	117	546	0	0	86	± 20	19	± 8	10
2010	919	0	0	134	32%	224	54%	55	13%	413	459	0	0	60	± 0	25	± 0	15
2011	896	0	0	113	38%	149	50%	36	12%	298	389	0	0	76	± 10	24	± 5	14
2012	500	0	0	99	42%	103	44%	34	14%	236	389	0	0	96	± 13	33	± 6	17
2013	500	0	109	109	40%	122	44%	44	16%	275	417	0	89	89	± 10	36	± 5	19

2014 HUNTING SEASONS
JACKSON MOOSE HERD (MO103)

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
7, 14, 15, 19, 32						CLOSED
17, 28	1	Sep. 15	Oct. 31	5	Limited quota	Antlered moose
18	1	Oct. 1	Oct. 31	5	Limited quota	Antlered moose

Special Archery Seasons

Hunt Area	Dates of Seasons	
	Opens	Closes
17, 28	Sep. 1	Sep. 14
18	Sep. 1	Sep. 30

Summary of
2014 License Changes

Hunt Area	Type	Change from 2013
17, 28	1	- 5 days
		+5 days for archery season

Management Evaluation
Current Postseason Population Management Objective: 3,600
Management Strategy: Special
2013 Postseason Population Estimate: ~500
2014 Proposed Postseason Population Estimate: ~500

The management objective for the Jackson Moose Herd Unit is currently 3,600 moose. Spreadsheet models developed for this moose herd do not appear to adequately simulate observed trends and therefore managers will develop a proposal using a mid-winter trend count as the benchmark for this population in 2016. The management strategy for this herd is designated as Special Management and was last revised in 1999.

Herd Unit Issues

This population is well below the post season management objective. Population declines were most evident from 2000 – 2003 and research on moose in the northern portion of the herd unit indicated that a number of factors were influencing this population (Becker 2008, Vartanian 2011). In spite of hunting season closures and a reduction in the number of permits, this population has been delayed in responding to management changes. Large scale wildfires during the late 1980s and more recently have also influenced summer moose habitat. Re-colonizing carnivores and parasites such as carotid artery worm and winter ticks also pose additional challenges.

Weather

Following an extremely dry summer and fall in 2012, weather conditions in 2013 were considerably wetter. The area received significant pulses of spring and fall moisture, which improved forage conditions for moose and other ungulates. At the time of the mid-winter survey, winter precipitation was reported at 109% of normal. Deep snow was observed in several moose winter ranges during the mid-winter survey. Please refer to the following web sites for specific weather station data. **http://www.ncdc.noaa.gov/temp-and-precip/time-series** and **http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html**

Habitat

Browsing pressure varies greatly between winter ranges, but on average, about 25% of willow leaders were browsed in winter 2012/2013. Winter ranges have not been monitored in winter 2013/2014. Live-dead indices are generally positive, indicating that browsing pressure is not preventing willows from reaching their natural height. This monitoring indicates that moose winter ranges are slowly improving north of Jackson. Summer habitat has been modified by several large-scale wildfires in recent years, greatly reducing thermal cover for moose. The Bear Cub Fire (6,493 acres) and North Buffalo Fire (29,950 acres) burned in the Teton Wilderness in 2012, and the Nowlin Fire (4,422 acres) burned in 2011. Recent research by the Wyoming Coop Unit (Vartanian, 2011) suggests that high intensity wildfires also negatively impact forage quality for moose.

The Wyoming Game and Fish Department and Bridger-Teton National Forest initiated a project to monitor the short-term and long-term nutritional changes in moose forage species after wildfire at different severities. This project will track the nutritional content over 10 years of key forage species that burned at several fire severities during the Red Rock Fire in the Gros Ventre in 2011. Also, a current study by a doctoral student at the Wyoming Cooperative Research Unit (Brett Jesmer) is further investigating relationships between habitat condition and moose population performance statewide, including the Jackson herd.

The Dry Quad Prescribed Burn was completed in fall 2013 in cooperation with Bridger Teton National Forest to improve elk and moose habitat. The burn treated approximately 60 acres of decadent aspen stands south of Spread Creek. Please refer to the 2013 Strategic Habitat Plan Annual Report for Jackson Region habitat improvement project summaries (**http://wgfd.wyo.gov/web2011/wildlife-1000708.aspx**).

Field Data

In February 2014, classification surveys were flown over low elevation winter ranges. We observed 275 moose this year, up from the 237 observed last year. The herd unit calf:100 cow ratio continued to improve with 36:100 this year. This ratio has been slowly improving every year since 2008 when a ratio of 15:100 was observed. The bull:100 cow ratio also remained high this year at 89:100. Ratios differed between herd segments in the Gros Ventre and Buffalo Valley. Buffalo Valley ratios were higher overall with a calf:cow ratio of 44:100 and a bull:cow ratio of 148:100. The calf:cow ratio in the Gros Ventre was 33:100 and the bull:cow ratio was 76:100. The highest densities of moose were observed along Fish Creek, along the Gros Ventre River east of the Fish Creek feedground, in the Buffalo Valley, and along the Buffalo Fork near Moran Junction. Due to unfavorable weather conditions, not all of the areas normally flown were surveyed this year. The total count would likely be higher if we were able to survey all areas.

Moose densities in the Willow Flat/Oxbow Bend Area (24 km^2) have declined from an average of 4 moose per km^2 in 2000 (n=48 moose) to 0.16 moose per km^2 in 2010 and 2012 (n=4). The density of moose has also declined on winter ranges in the Buffalo Valley (30 sq km^2). Houston (1968) documented 20 moose per km^2 and densities have declined to 7 moose per km^2 in 1999, 2.7 moose per km^2 in 2009 and 1.6 moose per km^2 in 2012.

Harvest Data

During the 2013 season, 9 bull moose were harvested. License quotas were decreased during each of the last five years in response to declining trends. During 2013 hunter success remained high and hunter effort remained similar to 2012 at 4.3 days per animal. Winter classification and trend data from this past winter indicate that the herd may be rebounding.

Population

POP II simulations likely overestimated moose numbers in the Jackson population. Spreadsheet models developed for this herd also do not appear to adequately simulate observed trends. Based on the observability of marked animals during recent research projects it is likely there is less than 500 animals in this population. Although the population remains low, aerial survey data

from recent postseason classifications indicate a high number of bull moose in the population and an improving calf:cow ratio. It is possible that the Jackson moose population may have bottomed out and with the observed increased calf:cow ratios this population may be able to sustain a low level of harvest.

Management Summary

To offset observed population declines, antlerless moose hunting was eliminated in the Teton Wilderness in 2001 and in the Gros Ventre drainage in 2004. Bull moose hunting seasons were closed in the Teton Wilderness in 2011 (Areas 7, 14, 15 and 32), and Areas 17 and 28 were combined into one unit for the 2012 season. Despite these changes the moose population north of Jackson continued to decline through 2012. It is possible that with the current trend of improved calf production, limited hunting opportunity can be sustained several more years unless the overall number of cows in the population declines.

Conservative hunting seasons are again planned for 2014 with 10 licenses offered for the Gros Ventre drainage. Total cow numbers and calf:cow ratios show a promising improvement this year, but the herd will continue to be closely monitored in future years to evaluate whether additional hunting opportunities can be provided. The overall number of cows improved this year and with the improved calf:cow ratios, a complete closure to hunting moose north of Jackson is not warranted at this time.

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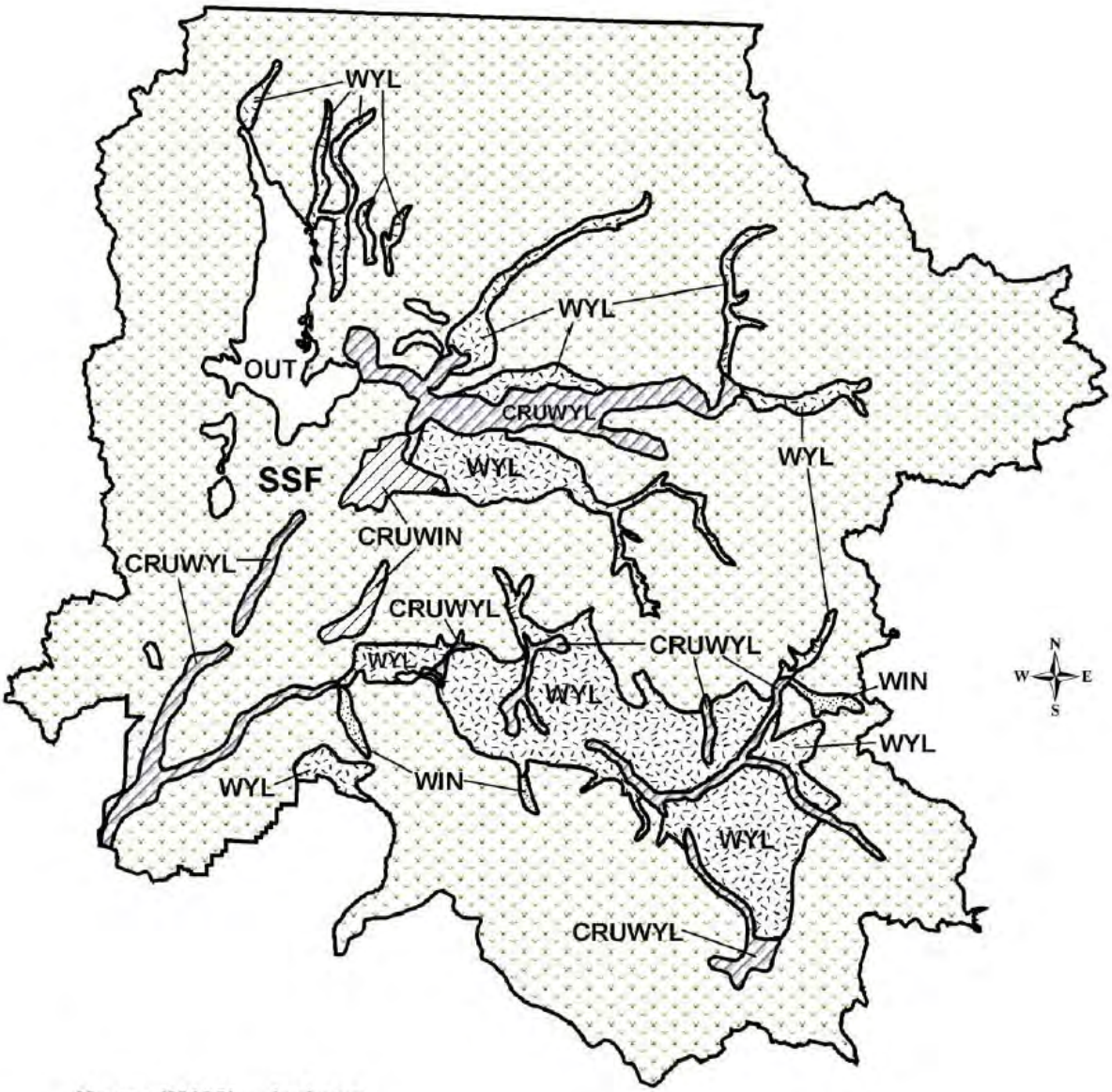

Moose (M103) -- Jackson
HA 7, 14, 15, 17-19, 28, 32
Revised 11/1994

Statewide Moose Habitat Project:

Linking Habitat and Nutrition with Population Performance in Wyoming Moose

Annual Report 2013

Brett Jesmer[1,2], Jacob Goheen[1], Matthew Kauffman[3], Kevin Monteith[1,2], Aly Courtemanch[4]

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[2]Wyoming Cooperative Fish and Wildlife Research Unit
[3]USGS, Wyoming Cooperative Fish and Wildlife Research Unit
[4]Wyoming Game and Fish Department

Background & Objectives

The Wyoming Game & Fish Department (WGFD), Wyoming Cooperative Fish and Wildlife Research Unit, and the University of Wyoming initiated the Statewide Moose Habitat Project in June 2011. Currently, Shiras moose (*Alces alces shirasi*) herds in the state (Fig. 1) are exhibiting a wide range of population performance, with some declining and some relatively stable or even increasing despite historic declines (Fig. 2). For the declining herds, potential mechanisms that may affect carrying capacity are habitat deterioration due to current and historic overbrowsing (Boertje *et al.* 2007; McArt *et al.* 2009), and regional variation in forage quality due to climatic warming and drying (Monteith *et al.* in review) or other disturbances, such as large, intense wildfire (Vartanian 2011) or bark beetle (*Dendroctonus* spp.) outbreaks. Additionally, a new and growing predator community is present in the northwest corner of the state and may prevent higher recruitment rates from being achieved, but these predators can not account for declines elsewhere in Wyoming, Colorado, and Utah. Further, a newly emergent disease, the carotid artery worm (*Elaeophora schneideri*), appears to be prevalent in Wyoming (Henningsen *et al.* 2012). Unfortunately we do not yet understand the impacts of this disease on the nutritional condition and survival of moose.

In combination with the observed range in population performance, variability of moose habitat (see Vartanian 2011, Monteith *et al.* in review) in the state represents a timely opportunity to evaluate habitat-performance relationships (i.e. local carrying capacities). Such a statewide habitat evaluation could serve as a benchmark to understand the relationship between moose habitat and population performance and would provide the WGFD with "early warning" metrics to predict where and when declines are likely to occur, and would improve the scientific basis of moose population objectives.

This project aims to both understand the role of habitat and nutrition in recent declines in population performance as well as provide managers with tools from which they can assess a populations proximity to carrying capacity and adapt management strategies accordingly. Therefore, we have developed the following objectives:

1. Understand the relationship between resource limitation and herd productivity.
2. Establish meaningful browse condition indices for monitoring and management purposes.
3. Explore alternative 'early warning' metrics to preempt declines in herd productivity.

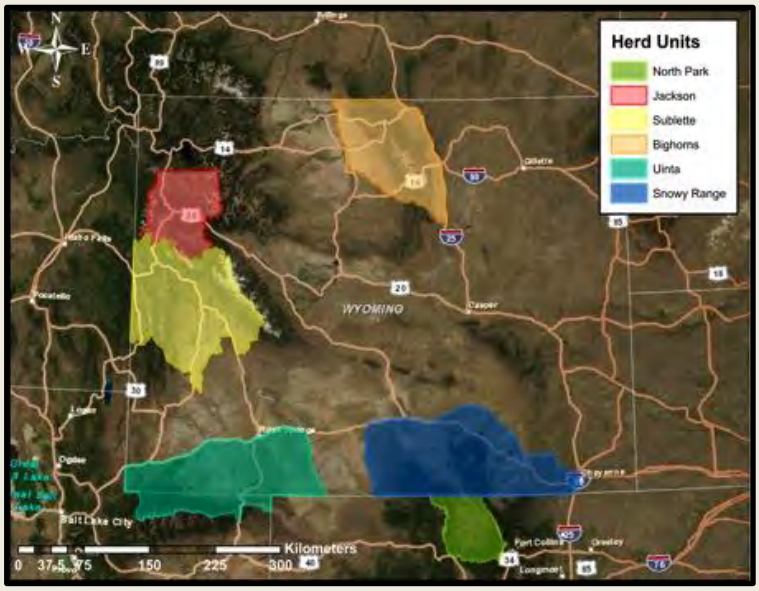


Fig. 1- Map depicting the project study areas.

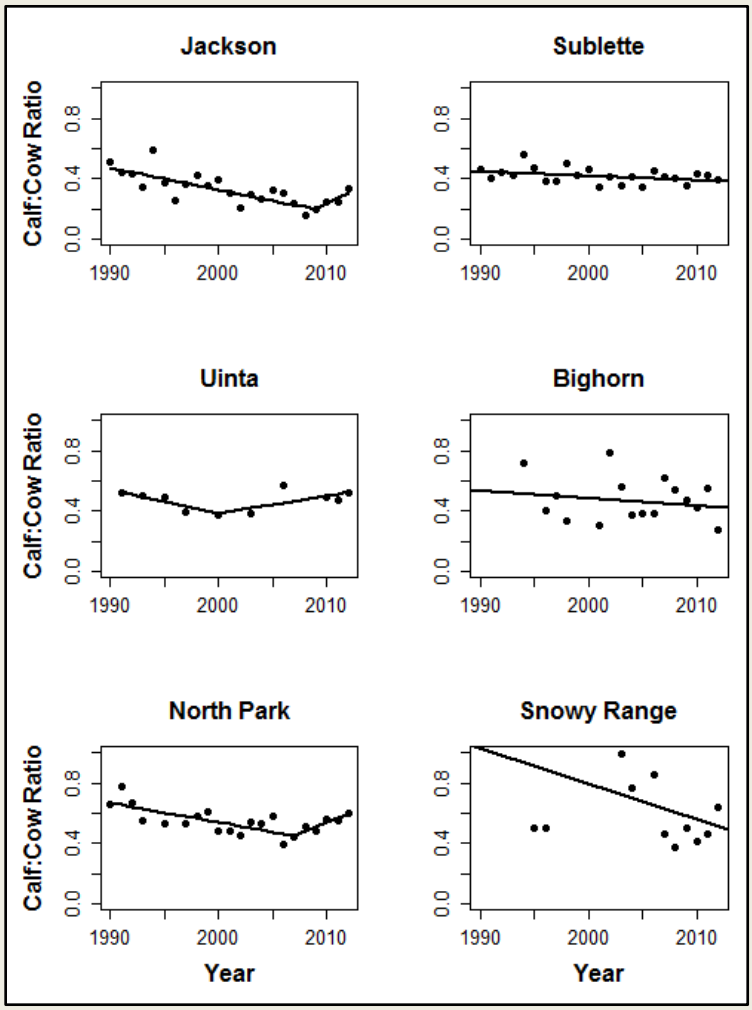


Fig. 2 – Trends in calf-cow ratios from 1990-2012 across our six areas. Trend lines established through piecewise regression. Piecewise regression quantifies multiple differing trends in a single data set. Note that the trend lines represented for the Snowy Range and Bighorn herd units are not statistically significant (P>0.05), meaning slopes are not different than zero.

Research Design & Methods

Vartanian (2011) concluded that **winter-range** was non-limiting to the Jackson moose population because of the underutilization of 'peripheral' winter-ranges that were previously described as heavily used by Houston (1967). Therefore, we used stratified random sampling across core (red) and peripheral (blue) winter ranges (both ranges defined as areas available to overwintering moose) to characterize the extent of willow browse utilization in each of six study areas. To quantify **winter habitat condition**, we used the WGFD Wildlife Observation System (WOS) moose location dataset and a local convex hull (LoCoH) home-range estimator to calculate core (%50 herd-range; red) and peripheral (%95 herd-range; blue) herd-ranges (Figs. 3, 4 and 5). Only WOS location data collected post-hunt from 2000 through 2012 were used in herd-range analyses.

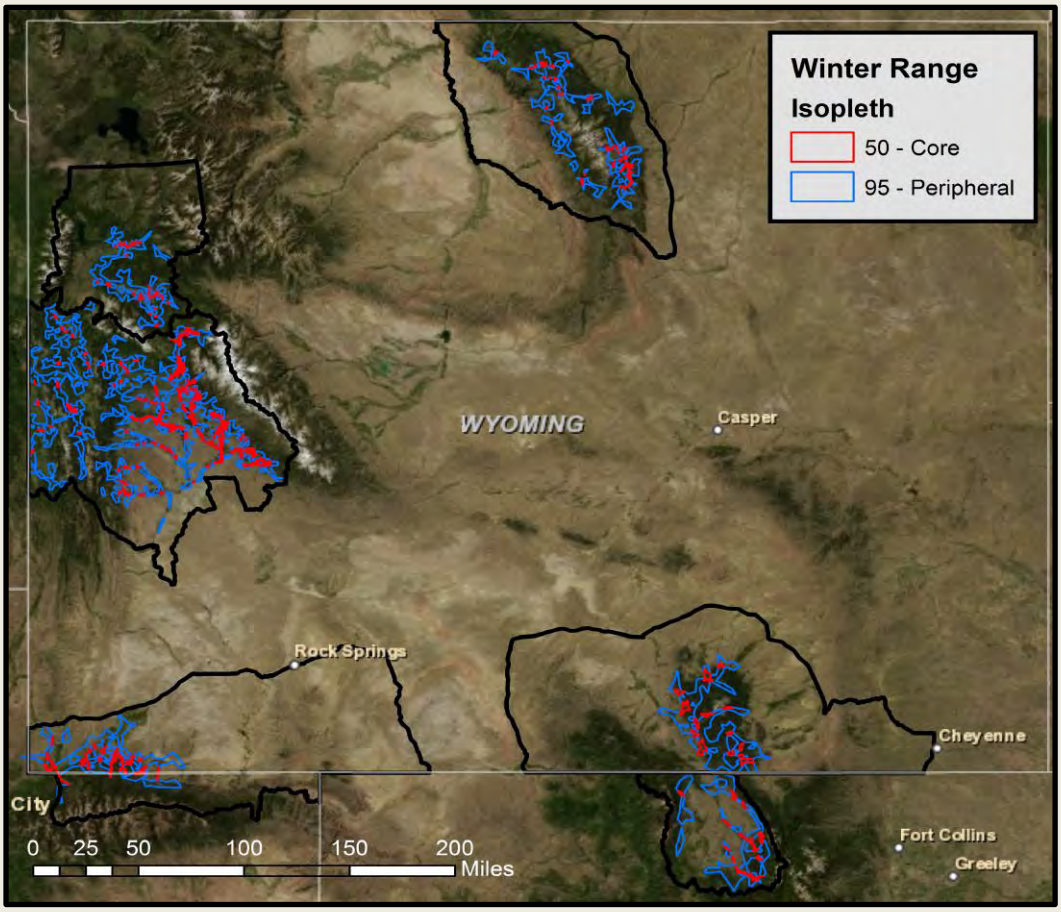


Fig. 3- Distribution of core (50%; red) and peripheral (95%; blue) moose winter ranges across the six study areas. Note- not all core and peripheral areas displayed here were sampled (see pg. 4 for details).

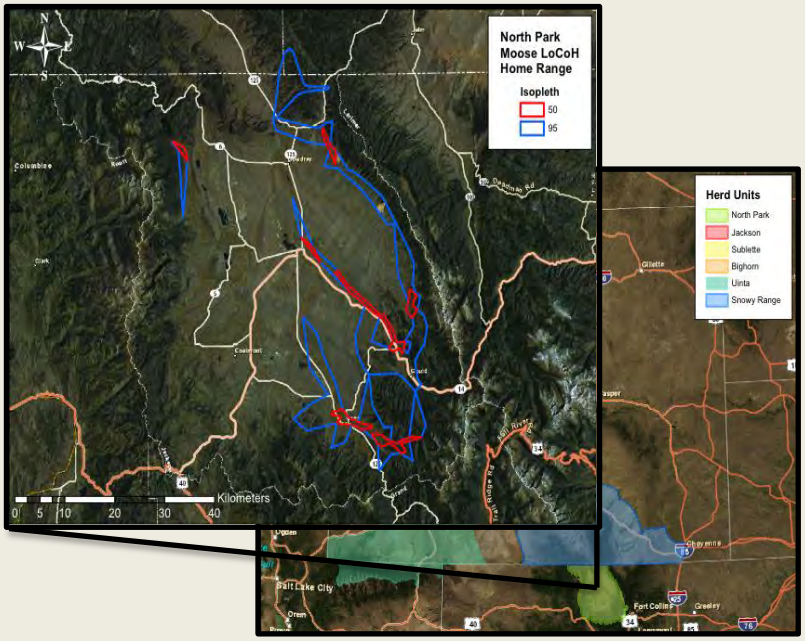


Fig. 4- In each herd unit, such as North Park (shown here), core (red) and peripheral (blue) moose habitat was identified to guide sampling of willow browse conditions and scat (see pg. 5 for details).

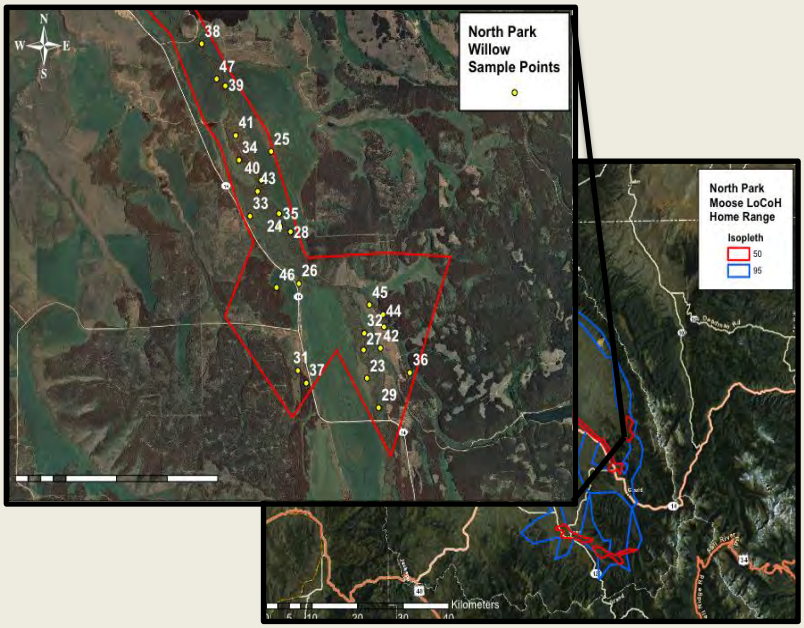


Fig. 5- Within each core and peripheral range, such as North Park's Michigan River (shown here), randomly generated points were drawn in willow habitat to prevent observer bias (see pg. 5 for details).

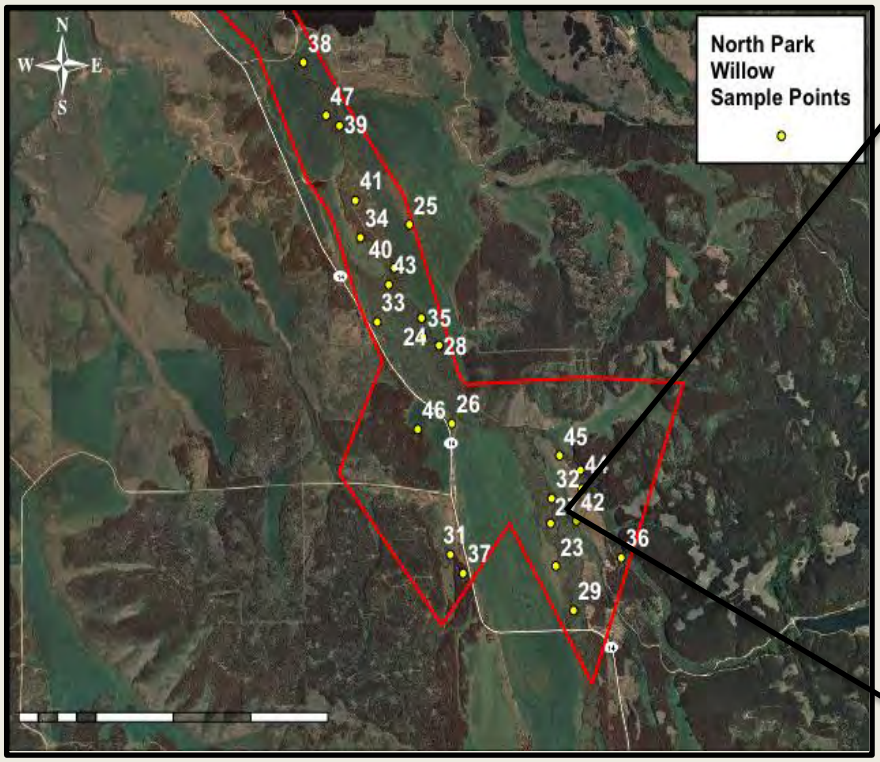


Fig. 6- Map depicting randomly generated sample sites in willow habitat along the Michigan River, Jackson County, CO.

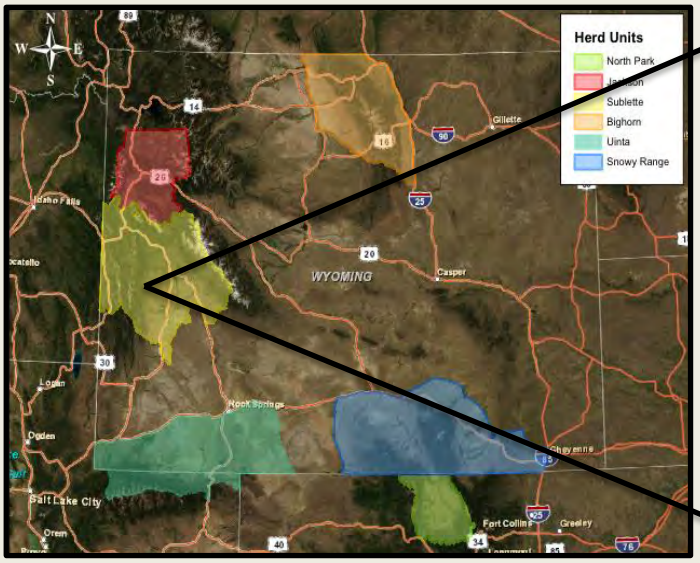
Fig. 7- Technician**,** Allie Hunter, takes an LD reading along Spread Creek, Teton County, WY.

Within core and peripheral ranges we plotted random points with a minimum of 200m spacing between points using a generalized random tessellation stratified (GRTS; Stevens and Olsen 2004) sample generator (R; Sdraw package) to develop a spatially-balanced random sample across the two strata. Using the NLCD we calculated sampling weights by determining the proportional amount of willow habitat in each polygon (i.e. drainage) per herd unit using the tabulate area tool in ArcGIS (ESRI 2011; spatial analyst tools); meaning drainages with relatively greater amounts of willow received greater number of sampling points. In 2012 financial and logistical constraints determined that 30 live-dead (LD; measure of willow condition; Keigley and Fager 2006) transects could be accomplished per herd unit. Therefore, we multiplied the proportion of willow (i.e. sampling weight) in each of the six drainages per herd unit by 30 to calculated the final number of transects per drainage. In 2013 we increased our sample by adding 5-10 transects per herd unit as time permitted. Final sample sites were chosen in the sequential order that they were generated in GIS. However, in some cases a lack of land owner permissions or accessibility inhibited us from sampling in exact sequential order.

We completed LD transects at each randomly selected sampling point across the six study areas (Fig. 6 and 7). According to previously established protocols (see Keigley and Fager 2006; Vartanian 2011; Smith et al. 2011), 20 willow plants of the most preferred species (planeleaf willow (*Salix planifolia)* in the eastern herds, Booth's willow (*Salix boothii*) in the western herds) were measured along a random bearing every 10m starting at each sampling point. LD, leader length of the dominant apical meristem, percent browse, percent decadence, and plant height were recorded at each plant.

To assess **winter diet** (i.e. foraging behaviors) and identify important **winter forages**, we collected scat samples opportunistically and along LD transects (Fig. 8) according to a sterile protocol developed to eliminate cross contamination. We only collected scats that appeared to be fresh and were determined to have originated from an adult moose according to morphometrics (i.e. size). Using molecular techniques we will group scat piles by individual and determine sex prior to diet and **pregnancy** analyses (via progestagen analysis; Monfort et al.1993), and potentially assess nutritional state via additional hormone (triiodothyronine (T3) and glucocorticoid (GC)) assays (Wasser et al. 2000, 2010). Progestagen, T3 and GC thresholds will be validated using scats, blood samples and ultrasonography data collected during captures associated with the Sublette and Uinta moose studies.

Fig. 8- Scats found along North Horse Creek, Sublette County, WY.



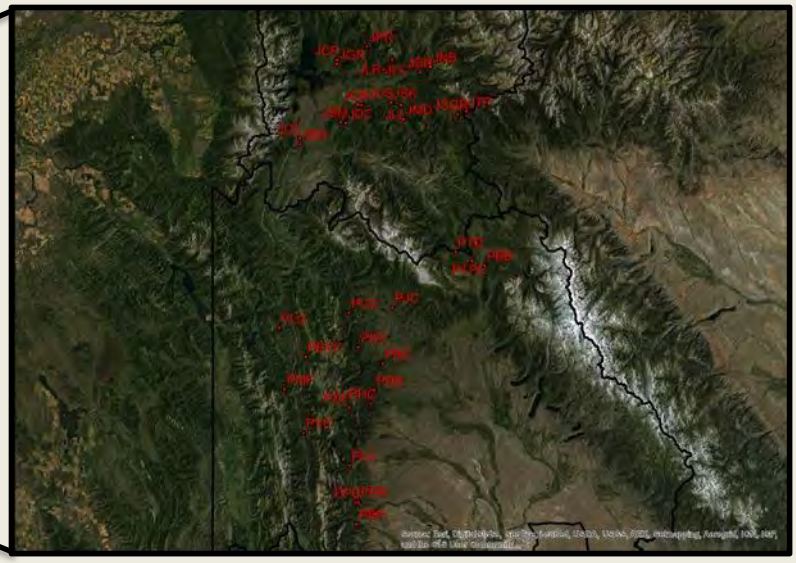


Fig. 9- Map depicting randomly generated sample sites across different habitats where summer scats were sampled in Sublette and Teton Counties, WY.

To characterize the range of **diets** (i.e. foraging behavior) and the **quality of forages** used by moose on **summer ranges**, we once again employed a stratified random sampling design. Due to the widely-reported preference for riparian and upland shrub forage amongst moose inhabiting montane regions of North America (e.g., Renecker and Schwartz 2007), we chose two strata consisting of: (1) willow habitat, and (2) all other upland habitat types (i.e. deciduous forest, coniferous forest, mixed deciduous and coniferous forest, shrub-scrub, grassland-herbaceous, and emergent herbaceous wetlands) as defined by the NLCD. We again used a generalized random tessellation stratified sample generator to develop a spatially-balanced random sample across the two strata (Fig. 9). To ensure that our scat-dog teams found as many fecal samples as possible, we restricted our search effort across strata to the top 25% quantile (summer core area) of the Baigas *et al*. (2010) summer RSF model. Logistical and financial constraints determined that 20 transects (10 willow, 10 upland) per herd unit (i.e. statewide n=120) could be completed within a single season. We chose sampling points in sequential order from which they were drawn until 10 samples from each strata were established using the following criteria: (1) < 1500m from a drivable road due to the limited distance in which a working dog can travel on any given day, (2) the willow patch must have been $\geq$ 2000m in Euclidean length, and (3) the patches were within a logistically feasible proximity (daily travel distance) to another sampling point whereby we could complete two transects per day. Each transect started at, or intersected with, the sampling point.

We collected moose scats along each transect when present (see figs. 10 and 11) using a sterile protocol. Currently, we are extracting DNA from scats (see pg. 6) to determine individuality and sex prior to diet (microhistology or qPCR) and forage quality (fecal nitrogen) analyses.

Fig. 10- Map illustrating a scat transect (5-6 km each) in willow habitat. Kilgore Creek, Sublette County, WY.

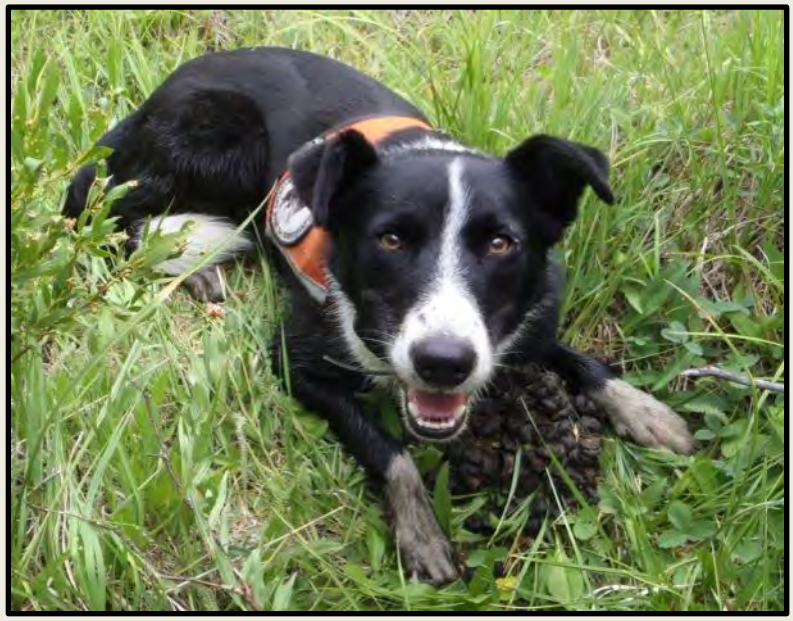
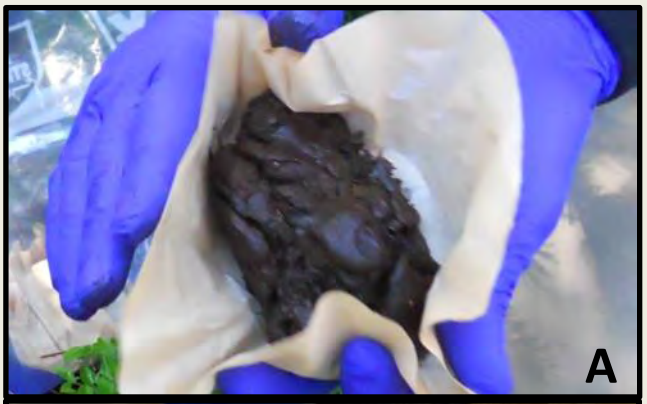


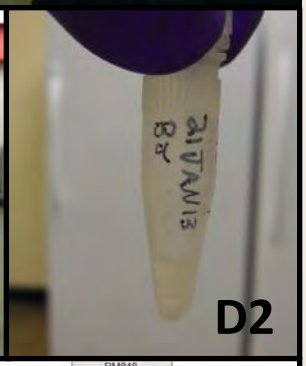
Fig. 11- Orbee the detection dog is very proud of his find (mostly he just wants his reward; a short game of fetch with a ball).

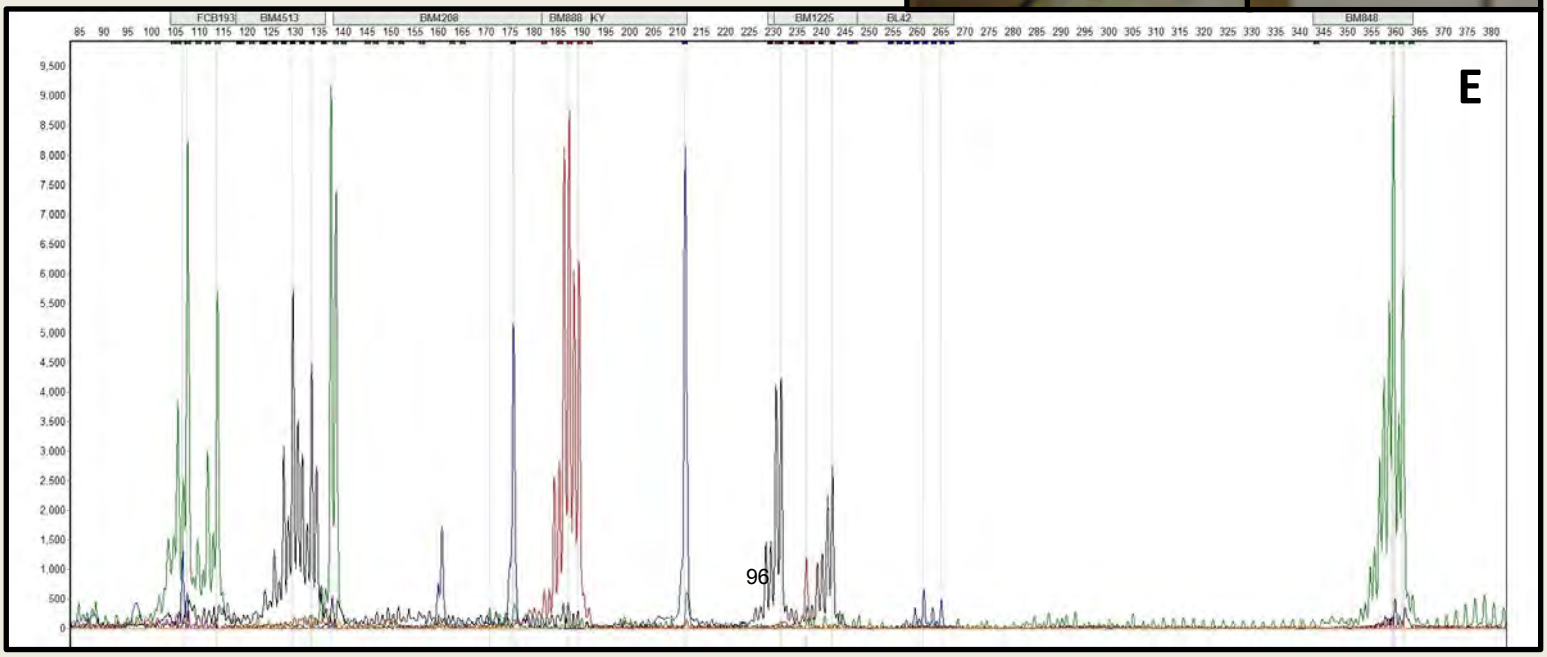
Only ‘fresh’ (i.e. typically <1 week old) scats were collected along each transect. When a fresh scat was identified, approximate age, GPS location, and habitat information was collected. The scat was then wrapped in non-bleached filter paper (coffee filters) and placed inside a plastic freezer bag on a bed of silica desiccant (photo A). The desiccant removed moisture from the scat during the day while we were in the field to help reduce bacterial action which degrades genetic material. Scats were placed in a portable battery/propane-powered freezer immediately upon returning to the campsite; followed by a cryofreezer once returning to the University of Wyoming.

Most of the DNA in moose feces is found in a ‘mucusy membrane’ on the outside of the ‘pellets’ where intestinal cells are sloughed off as the pellets move through the intestinal track. We collect portions of this ‘mucusy membrane’ (photo B) and place in vials with a substance that breaks down cell walls to release the genetic material (photo D1). We used a modified ‘ungulate’ DNA extraction protocol tailored specifically for moose scat in combination with Qiagen- QIAamp DNA stool mini kits© to obtain purified DNA products (photo D2).

Through a series of chemical reactions (photo C) we duplicate the DNA many times over and characterize nine specific portions of the genome that allow us to ‘fingerprint’ the sample so that we can identify which individual the scat came from and its sex (photo E). For example, photo E depicts nine microsatellite loci, represented by black, green, red and blue ‘peaks’, amplified from one individual moose tissue sample. The two tall blue peaks near the middle of the graph represent genetic products associated with the X and Y chromosomes; meaning this individual is a male. This process is extremely similar to that used by criminal forensic scientists and has been streamlined so that individual and sex identifications can be assessed simultaneously. We repeat this process 2-3 times for each of 1022 fecal samples we have collected and use computer software to match the samples to individual moose.



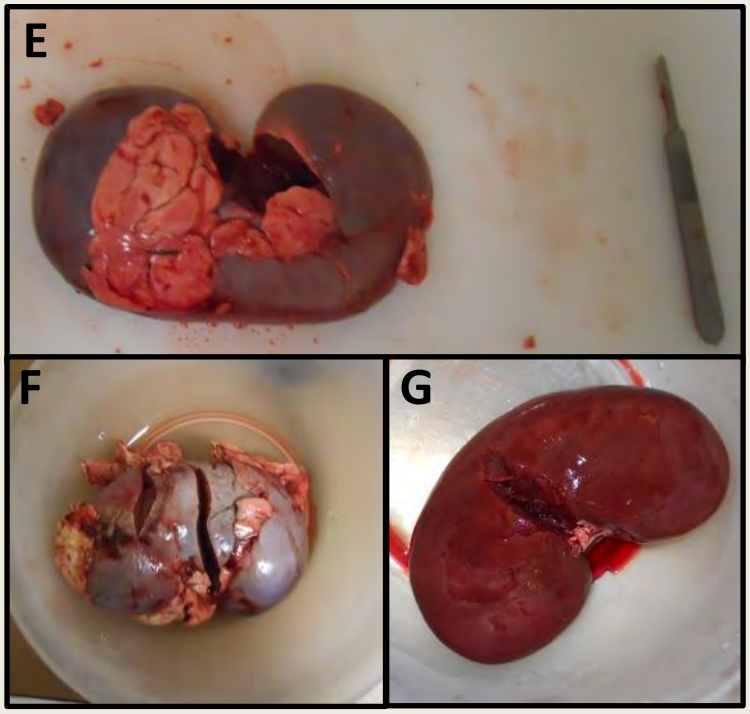


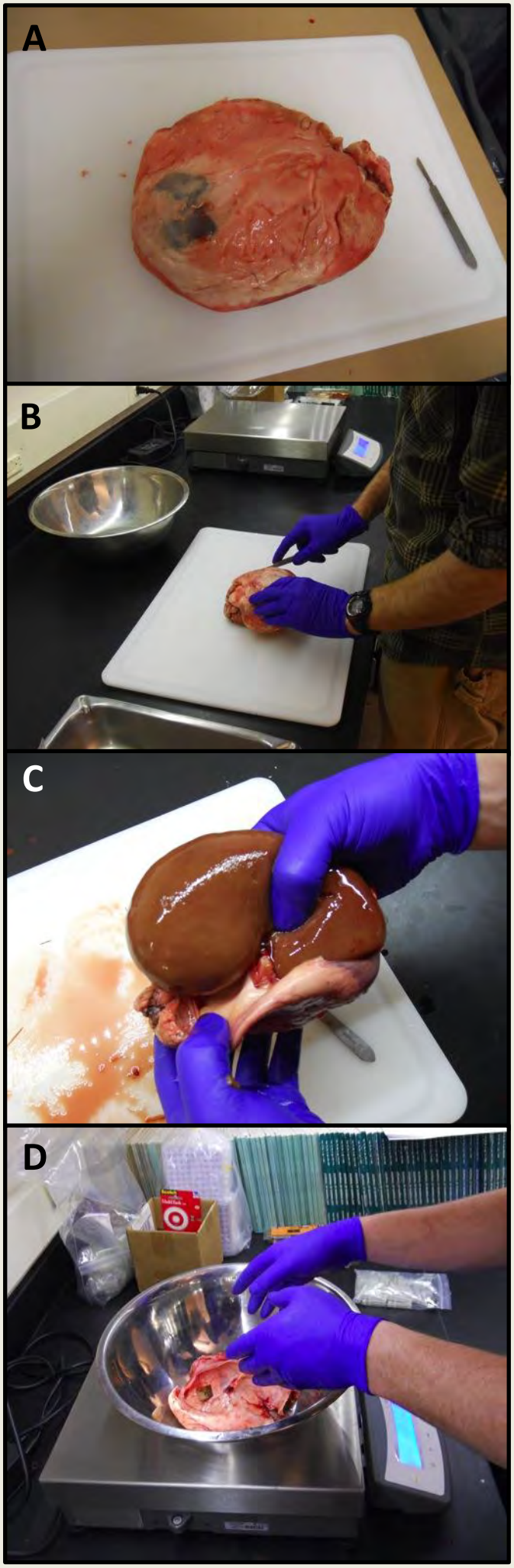


To understand how winter habitat condition and quality, and summer diet and forage quality affect the **nutritional condition** of moose, we are measuring autumn kidney fat. The amount of fat found attached to the kidney is a good predictor of total body fat in moose (Stephenson *et al*. 1998). We collaborated with the WGFD, Colorado Division of Parks and Wildlife (CDPW) and the Utah Division of Wildlife Resources (UDWR) to solicit hunters to collect kidneys from harvested moose. With each kidney, hunters and WGFD, CDPW and UDWR biologists noted sex, age, location of harvest (hunt area and drainage or GPS location), antler size (if any), and parasite information.

Kidneys were gathered by regional WGFD, CDPW and UDWR personnel and delivered to the University of Wyoming where we measured kidney fat levels according to the long-standing method of Riney (1955). Briefly, the kidney fat method requires an undisturbed kidney (photo A; identification of disturbed kidneys described below), trimming of excess fat to standardize the area of fat measured (photo B), removal of the fat and perirenal membrane (photo C), and a weight measurement of both the kidney and the kidney fat (photo D).

While processing each kidney, we noted whether or not the kidney and its fat appeared to be disturbed. Because some hunters are unfamiliar with moose anatomy and the exact location of the kidneys, they sometimes cut through visceral fat or the visceral cavity too quickly and end up cutting into the kidney fat (photo E) and even the kidney itself (photo F); and sometimes hunters even mistakenly removed all of the kidney fat (photo G). We omitted all samples from the final dataset that showed evidence of the fat being disturbed.





Preliminary Results

All results constitute preliminary summaries, not final statistical analyses, and should be interpreted with caution. Additionally, the data presented here only reflects autumn nutrition of moose and winter habitat condition (i.e. quantity of forage). Because winter habitat condition is only one of many factors that may influence autumn nutritional condition in moose (Parker *et al*. 2009), these trends may be strengthened or weakened once winter and summer diet and forage quality are included in the dataset. In fact, due to metabolic demands, summer forage quantity and quality is often considered to be more important to overall nutritional condition and pregnancy rates than winter forage condition or quality (Cook *et al*. 2004). It is also important to note that we only present nutritional condition data associated with male moose. The current and past (i.e. 1-2 years prior) reproductive history of all harvested female moose from which we received kidneys was unknown. The energetic demands associated with gestation, lactation, and calf rearing are important factors in determining autumn nutritional condition, and therefore likelihood of pregnancy, in ungulates (Parker *et al.* 2009). Consequently, we chose to use males as our indicator of nutritional condition at the population level because they are not influenced by as many factors as females. Even though males do not represent the reproductive portion of the population, and therefore have less influence of population performance, their nutritional condition remains an excellent indicator of habitat quality (Parker *et al*. 2009).

We completed 349 LD transects, representing 6980 individual willow plants measured, during 2012-2013. During 2011-2012 we analyzed 346 undisturbed kidneys for nutritional condition assessment. In 2013 we collected an additional 190 kidneys to supplement our sample. Nutritional condition was significantly different between the six herd units (Fig. 12; ANCOVA: P=0.02; note small sample size in Jackson). Willow condition according to the LD index was also significantly different amongst herd units (Fig. 13; ANOVA: P=<0.001). Interestingly, Baigas (2008) reported to the WGFD even poorer LD values for planeleaf willow. Also, we found that LD values for planeleaf willow and Booth's willow differed (T-test: P=<0.001). It is important to note that, although LD measures for all herd units dominated by planeleaf are statistically similar, the herd units exhibiting greater overall variation in willow condition (i.e. more patches in relatively good condition) are those herd units which are exhibiting better population performance (see figs. 14 and 15). Planeleaf is highly preferred by all large herbivores and consistently

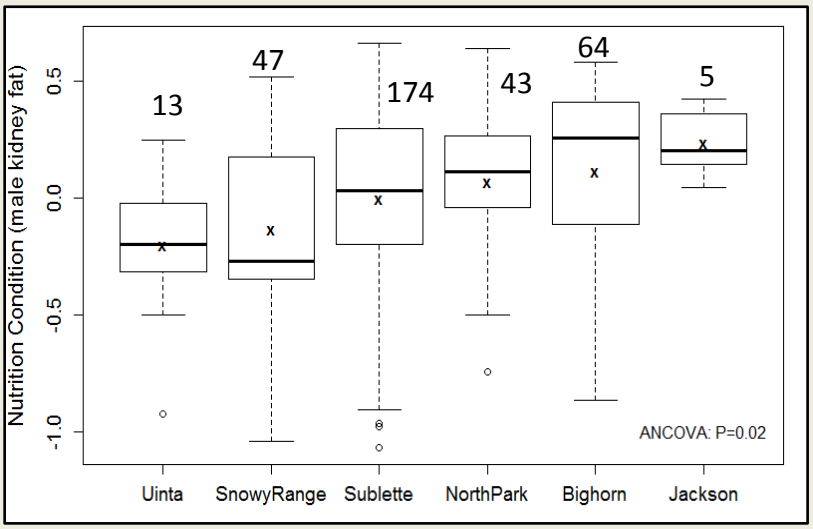


Fig. 12- Variation in male nutritional condition. X's represent means, bars represent medians, vertical lines represent the data range, circles represent outliers, and numbers represent sample sizes.

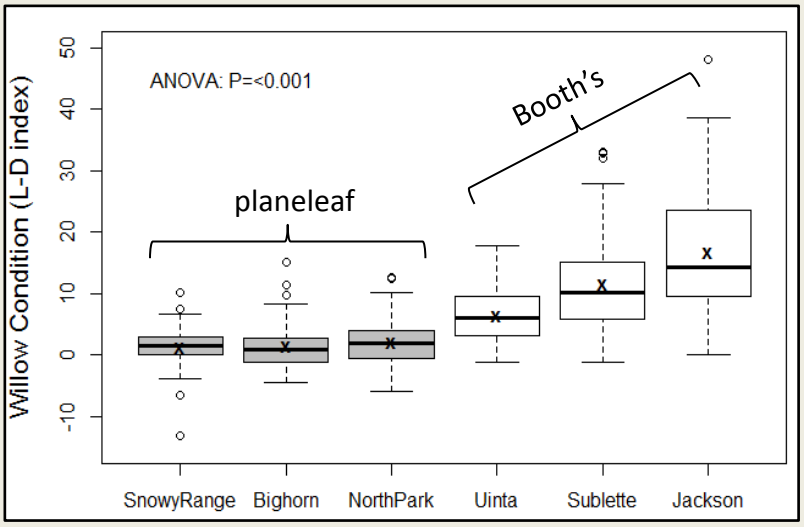
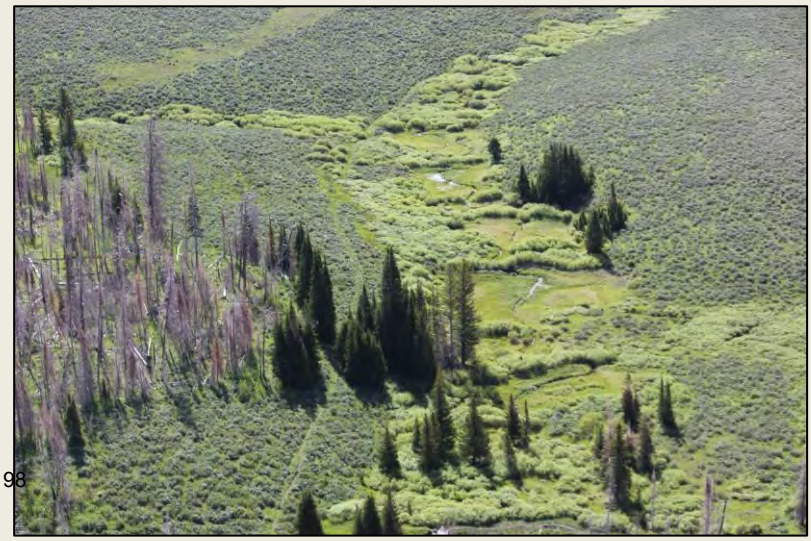


Fig. 13- Variation in willow condition. X's represent means, bars represent medians, vertical lines represent the data range, circles represent outliers, and numbers represent sample sizes.



browsed heavily. We further summarize the data using the means (x's) from figures 14 and 15 to assess the general relationships between winter forage condition, nutritional condition, and population performance (i.e. recruitment rates). Figure 14 suggests a positive relationship between winter willow condition and population performance. Figure 15 reveals that male nutritional condition in autumn is likely a good indicator of local population performance. Being able to observe relationships between winter-range willow condition and population performance, and autumn nutritional condition and population performance using simple summary statistics is an encouraging result. We suspect that we will be able to make strong linkages between habitat, nutritional condition and population performance once we assess summer and winter forage selection and quality.

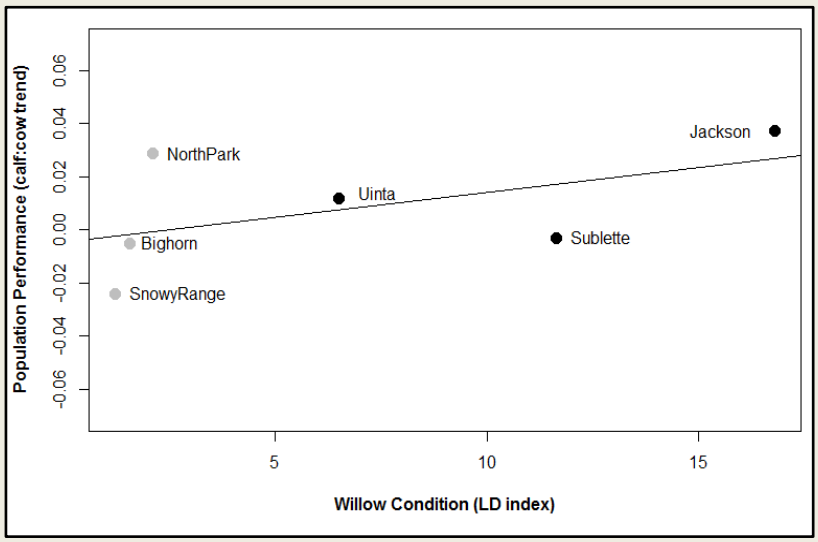


Fig. 14- General relationship between willow condition and nutritional condition of moose. Herd units dominated by the highly preferred planeleaf willow (grey circles) decline in performance as variation in willow declines, whereas herd units dominated by Booth's will decline in performance as overall willow condition declines (see fig. 13 and page 8 for details).

Current and Future Work

We continue to work towards achieving our objective of linking habitat and nutrition to population performance (Fig. 16), and suspect to complete the project during the fall of 2014. We are making daily progress with DNA extractions and genotype analysis. In 2013 we completed and a second round of winter scat collections willow condition transects. Additionally, we completed a third round of kidney collections, which represents the finalization of our field efforts. During spring 2014 we plan complete genetic analyses of 1022 fecal samples and obtain finalized diet composition, diet quality, pregnancy and spring nutritional condition data sets. Once data production is completed, we will produce comprehensive reports for state and federal agencies, provide presentations and materials for the general public, and publish our results in peer-reviewed scientific journals during summer and fall 2014.

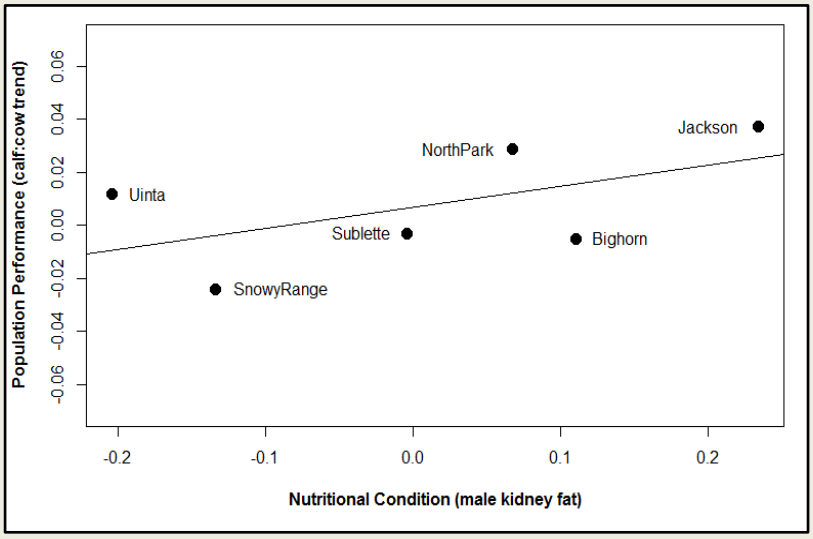


Fig. 15- General relationship between moose nutritional condition and population performance.

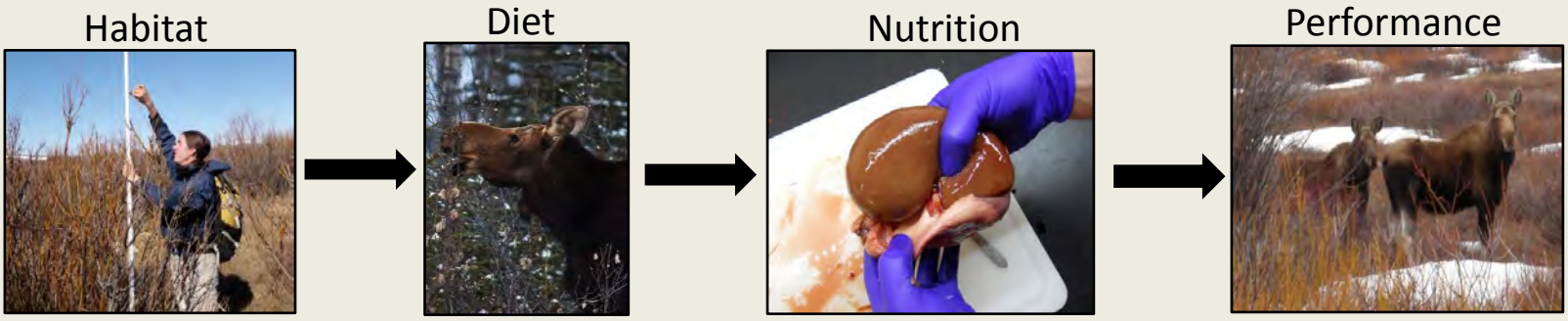


Fig. 16- General conceptual model depicting the linkages between habitat condition, diet quality and composition, and nutritional condition to population performance in Shiras moose. Once we able to quantify how these factors influence population performance, we will be able to provide managers with tools that will allow them to understand the proximity in which their population is to carrying capacity, and hence adapt management strategies accordingly.

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2013 - JCR Evaluation Form

Species: Bighorn Sheep

Period: 6/1/2013 - 5/31/2014

Herd: BS106 - TARGHEE

Hunt Areas: 6

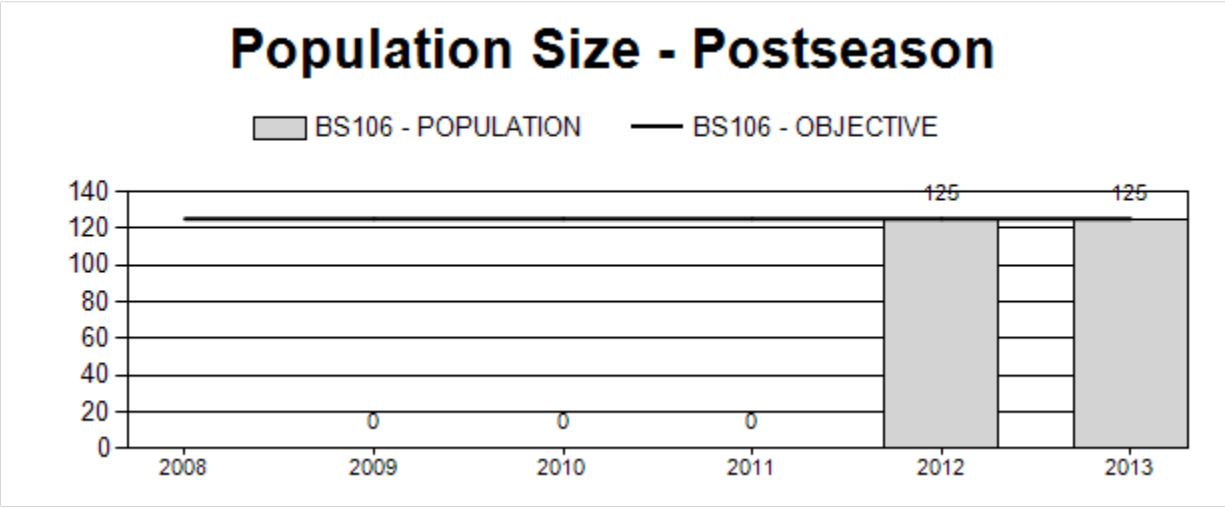
Prepared By: ALYSON COURTEMANCH

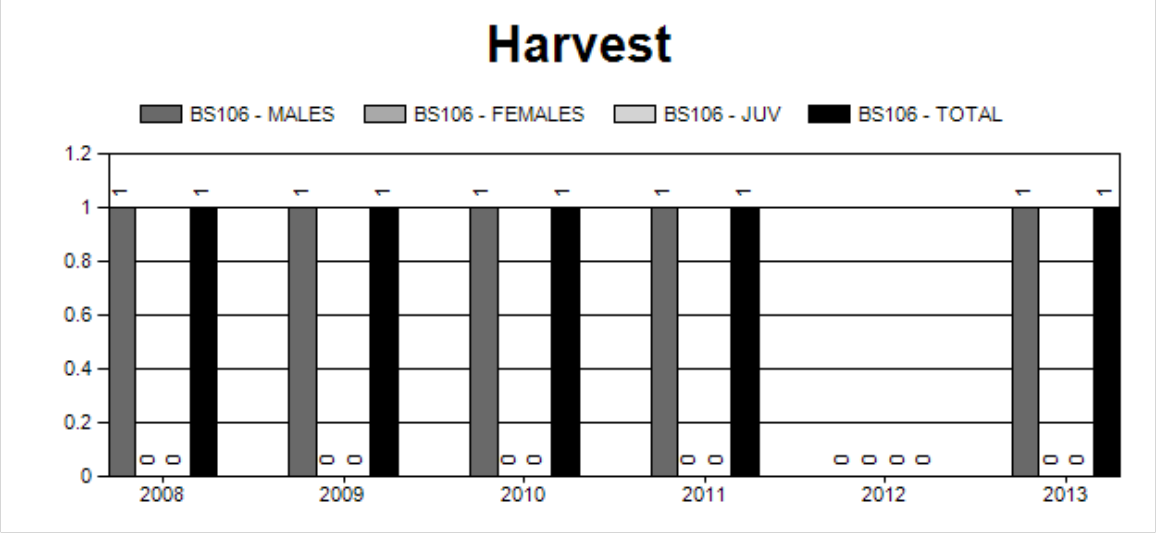
	2008 - 2012 Average	2013	2014 Proposed
Population:	25	125	125
Harvest:	1	1	1
Hunters:	2	2	2
Hunter Success:	50%	50%	50%
Active Licenses:	2	2	2
Active License Percent:	50%	50%	50%
Recreation Days:	16	12	20
Days Per Animal:	16	12	20
Males per 100 Females	35	0	
Juveniles per 100 Females	33	0	

Population Objective:	125
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	0%
Number of years population has been + or - objective in recent trend:	0
Model Date:	None

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

	JCR Year	Proposed
Females ≥ 1 year old:	na%	na%
Males ≥ 1 year old:	na%	na%
Juveniles (< 1 year old):	na%	na%
Total:	na%	na%
Proposed change in post-season population:	na%	na%




Harvest
BS106 - MALES
BS106 - FEMALES
BS106 - JUV
BS106 - TOTAL
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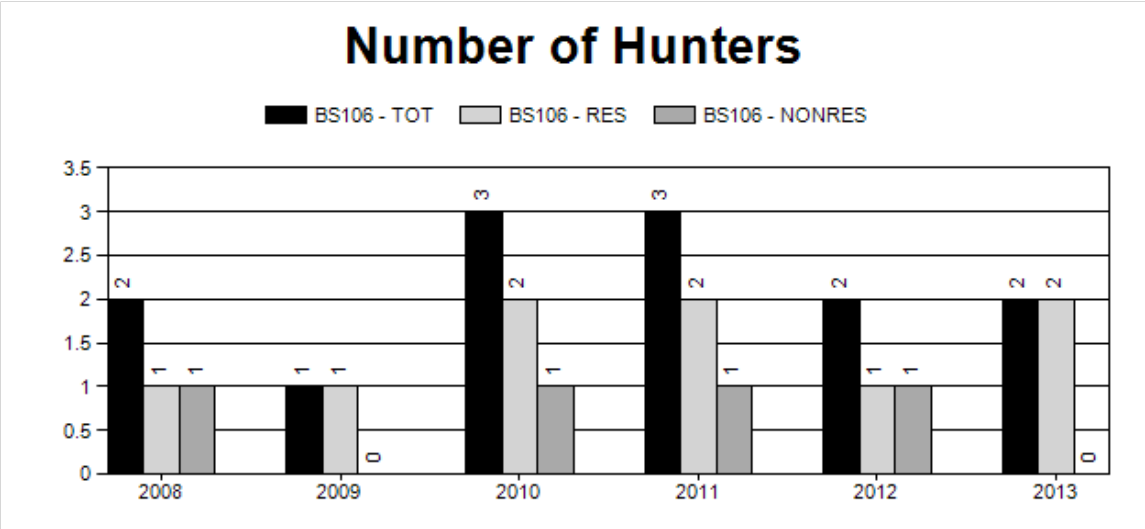
0.6
0.4
0.2
0
2008
2009
2010
2011
2012
2013


Number of Hunters
BS106 - TOT
BS106 - RES
BS106 - NONRES
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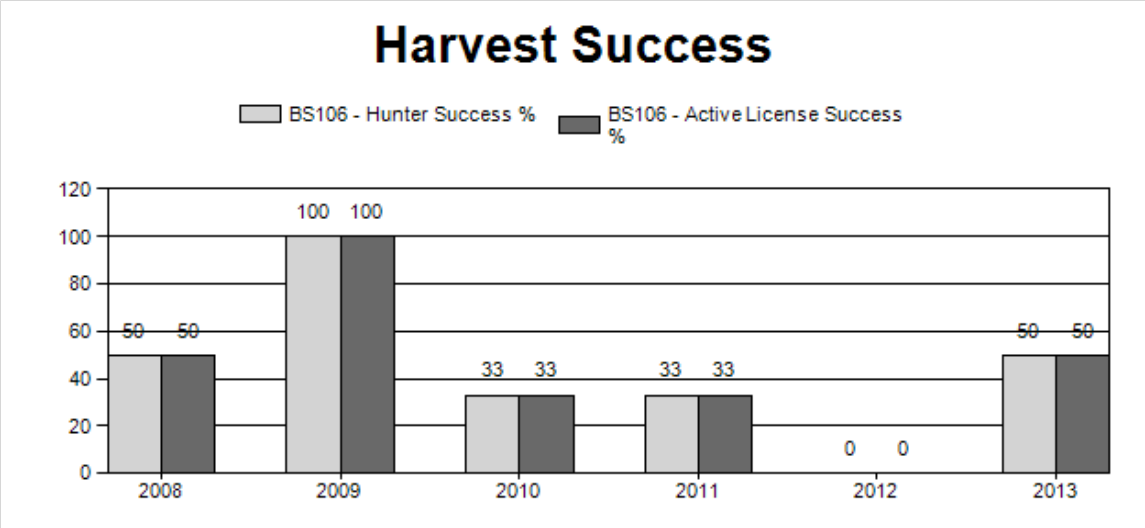
3
2.5
2
1.5
1
0.5
0
2008
2009
2010
2011
2012
2013


Harvest Success
BS106 - Hunter Success %
BS106 - Active License Success %
120
100
80
60
40
20
0
50 50
100 100
33 33
33 33
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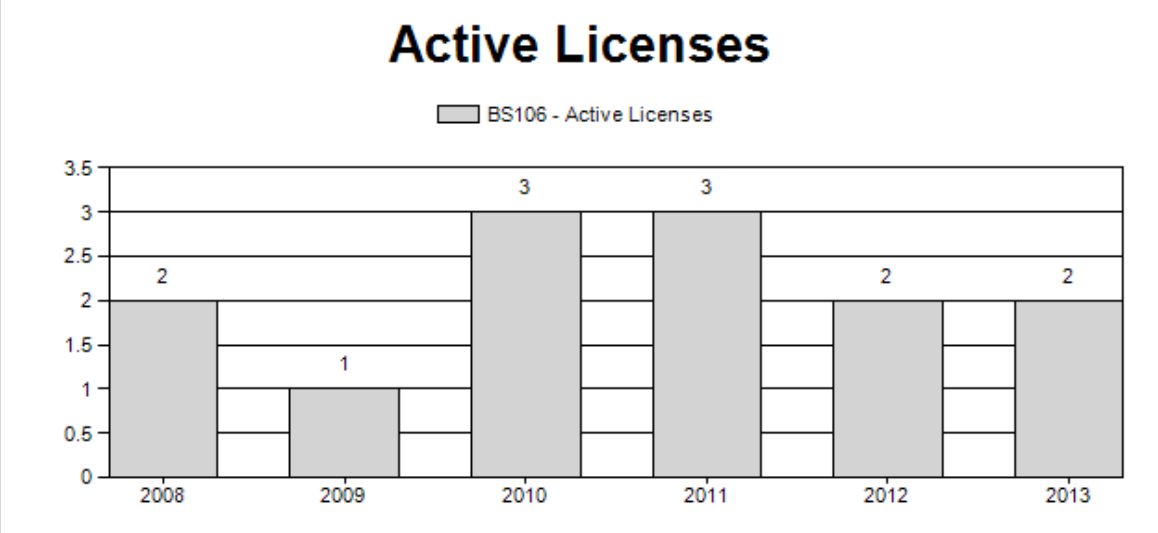
2008
2009
2010
2011
2012
2013


Active Licenses
BS106 - Active Licenses
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3
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2008
2009
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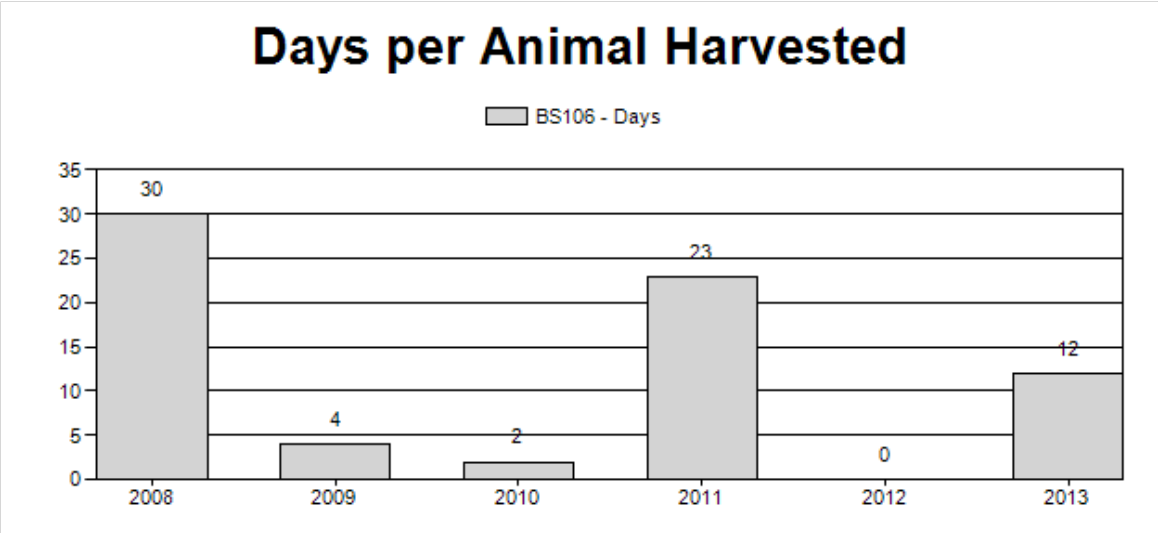
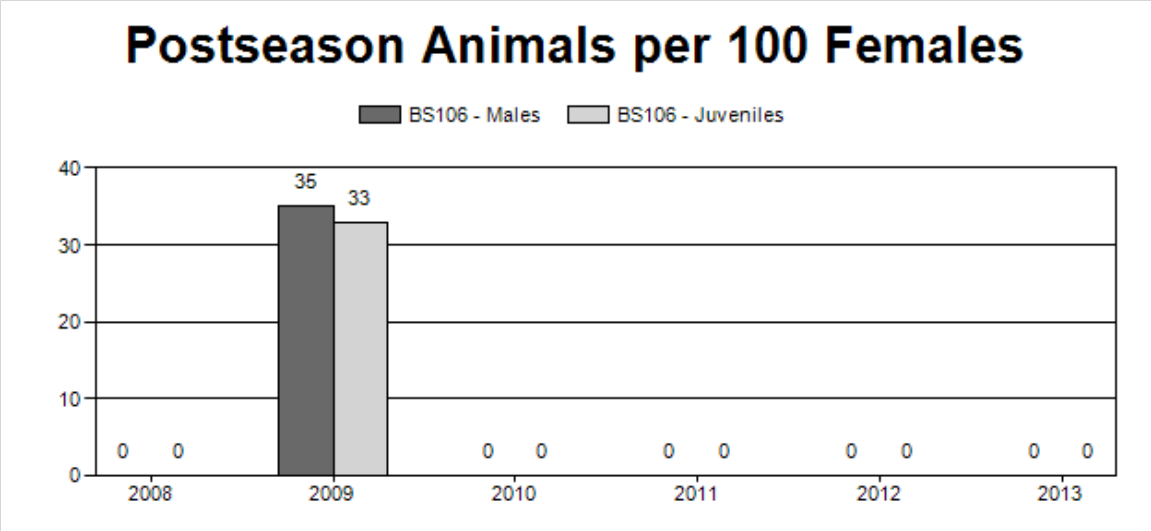
2013


Days per Animal Harvested
BS106 - Days
35
30
25
20
15
10
5
0
30
4
2
23
0
12
2008
2009
2010
2011
2012
2013


Postseason Animals per 100 Females
BS106 - Males
BS106 - Juveniles
40
30
20
10
0
0 0
35
33
0 0
0 0
0 0
0 0
2008
2009
2010
2011
2012
2013

2008 - 2013 Postseason Classification Summary

for Bighorn Sheep Herd BS106 - TARGHEE

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2009	0	1	16	17	21%	48	59%	16	20%	81	0	2	33	35	± 0	33	± 0	25
2010	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2011	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2012	125	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2013	125	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0

2014 HUNTING SEASONS
TARGHEE BIGHORN SHEEP HERD (BS106)

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
6	1	Aug. 15	Oct. 31	2	Limited quota	Any ram (1 resident, 1 nonresident)

Summary of 2014 License Changes

Hunt Area	Type	Change from 2013
6	1	–1 resident, +1 nonresident

<u>Management Evaluation</u>
Current Postseason Population Management Objective: 125
Management Strategy: Special
2013 Postseason Population Estimate: ~125
2014 Proposed Postseason Population Estimate: ~125

The management objective for the Targhee bighorn sheep herd unit is 125 sheep. Spreadsheet models developed for this herd do not appear to adequately simulate observed trends and therefore managers will develop a proposal using the mid-winter trend count as a benchmark for this population. The management strategy for this herd is designated as Special Management and will be reviewed in 2014.

Herd Unit Issues

Current occupied habitat is located at high elevations year-round in the Teton Range, mostly in Grand Teton National Park. Bighorn sheep winter on high elevation, windswept ridgelines in upper Jensen Canyon, Mt. Hunt, Prospectors Mountain, Static Peak, Mt. Wister, Ranger Peak, Doane Peak, and Elk Mountain. Winter habitat is most likely the limiting factor for this population. Transitional and summer ranges also include Darby, Fox, Moose and Teton Creeks

on the Caribou-Targhee National Forest (CTNF). Historically, this population was migratory and wintered at low elevations around Jackson Hole and Teton Valley, Idaho. In the past, hunters have had a difficult time locating sheep that are outside of the GTNP boundary in CTNF. However, bighorn sheep have recently increased their use of habitats on CTNF due to the buy-out of domestic sheep allotments. In 1997 the revised Caribou-Targhee National Forest Plan called for the retirement of the domestic sheep allotments on the west side of the Tetons. Since 2004 when the fifth and final allotment was retired with bighorn sheep conservation funds, bighorn sheep have started using these areas.

Mountain goat sightings have been increasing north of Wyoming Highway 22 indicating that their distribution is expanding north from the Snake Range into the Teton Range. In 2008, the first confirmed sighting of a nanny with kids was reported, suggesting an establishing population. In the future, field managers may need to consider potential impacts of an expanding mountain goat population on this small, native bighorn sheep herd.

Expanding winter backcountry recreation also impacts available winter habitat for bighorn sheep. Recent research from the Wyoming Cooperative Research Unit indicates that Targhee bighorn sheep avoid backcountry ski routes, even if they are in otherwise high quality habitat. This further constricts available winter habitat for bighorn sheep. A final master's thesis for this project is expected to be finished in May 2014.

Weather

Following an extremely dry summer and fall in 2012, weather conditions in 2013 were considerably wetter. The area received significant pulses of spring and fall moisture, which improved forage conditions for bighorn sheep and other ungulates. Winter precipitation was reported at 109% of normal by mid-February 2014. Please refer to the following web sites for specific weather station data. **http://www.ncdc.noaa.gov/temp-and-precip/time-series and http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html**

Habitat

There are no established vegetation transects in this herd unit. An upcoming habitat treatment is planned for this herd, in cooperation with Caribou-Targhee National Forest. The treatment will improve historical winter and transitional ranges in Teton Canyon and is tentatively scheduled for 2015. Please refer to the 2013 Annual Report Strategic Habitat Plan Accomplishments for Jackson Region habitat improvement project summaries **(http://wgfd.wyo.gov/web2011/wildlife-1000708.aspx)**.

Field Data

No field data were collected in the Targhee Herd Unit during the 2013 biological year.

Harvest Data

Data from the 2013 harvest survey indicate that 1 hunter harvested a ram. The hunter spent 20 days in the field.

Population

This population is thought to be near the post season management objective and the proposed mid-winter trend based on aerial surveys in 2008 and 2010.

Management Summary

Two licenses will be available for this herd in 2014, 1 resident hunter and 1 nonresident hunter. This bighorn sheep population is distributed both within GTNP and along the boundary in remote steep terrain making it difficult for hunters to locate and stalk sheep. As a result, harvest levels have remained low and on some years no sheep are harvested. Given the limited number of ram-only licenses available and periodic harvest, hunting likely not having an impact on this population. Two licenses for any ram will be offered for future hunts until more sheep are observed occupying areas outside GTNP on CTNF lands.

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Kardos, M.D., S. Dewey, S.J. Amish, J. Stephenson, and G. Luikart. *In prep*. Strong fine-scale population structure of Grand Teton National Park bighorn sheep suggests important role of philopatry in bighorn population subdivision.

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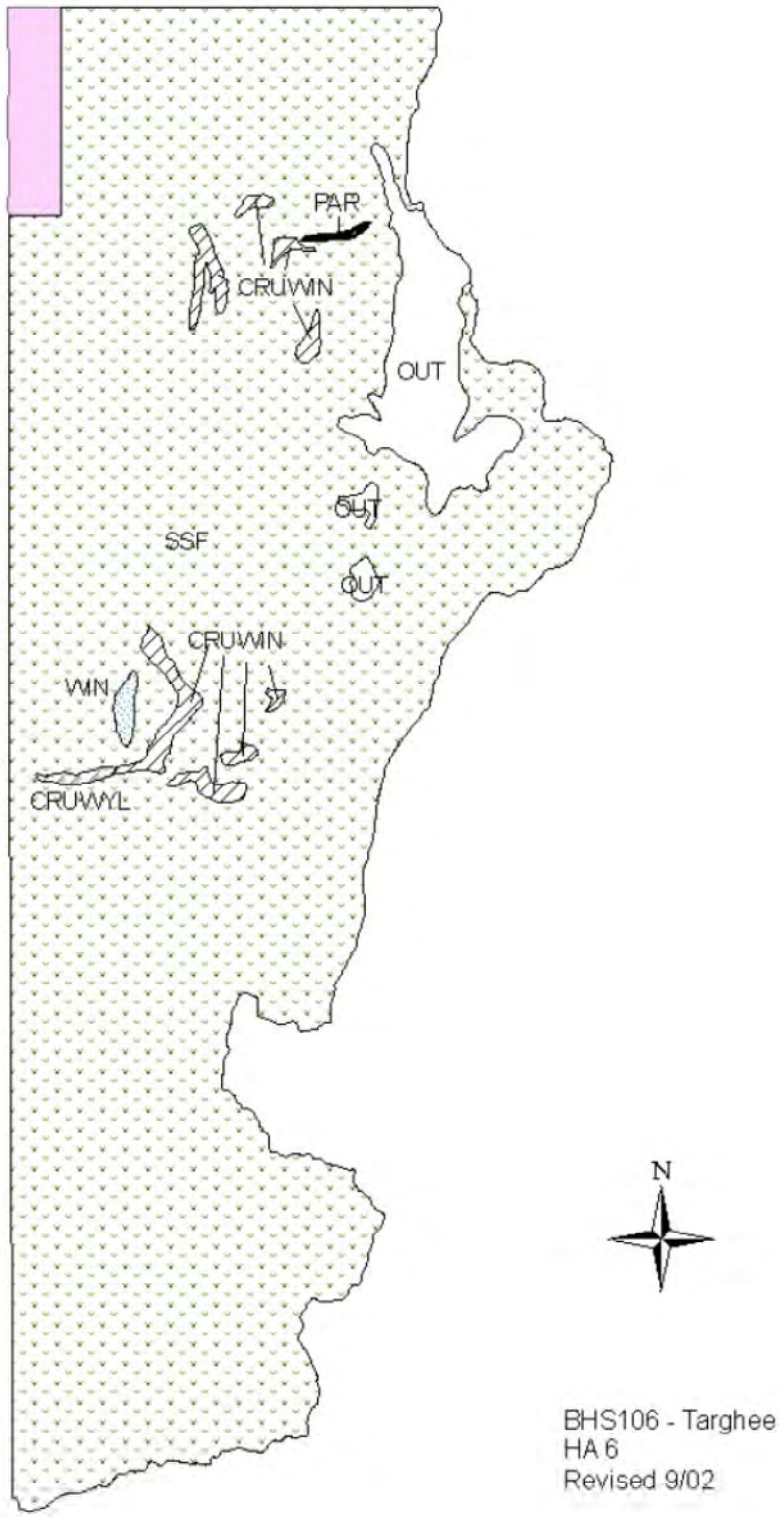


BHS106 - Targhee
HA 6
Revised 9/02

2013 - JCR Evaluation Form

Species: Bighorn Sheep

Period: 6/1/2013 - 5/31/2014

Herd: BS107 - JACKSON

Hunt Areas: 7

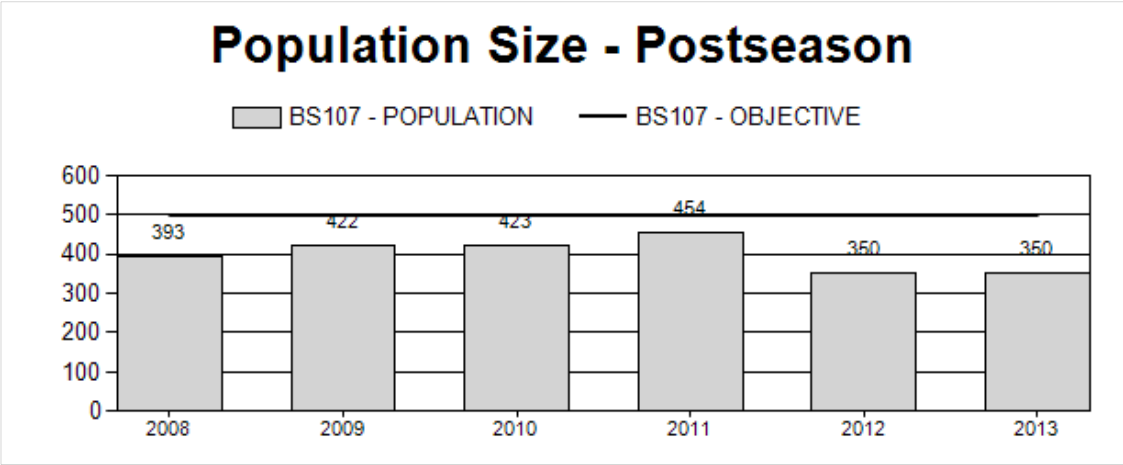
Prepared By: ALYSON COURTEMANCH

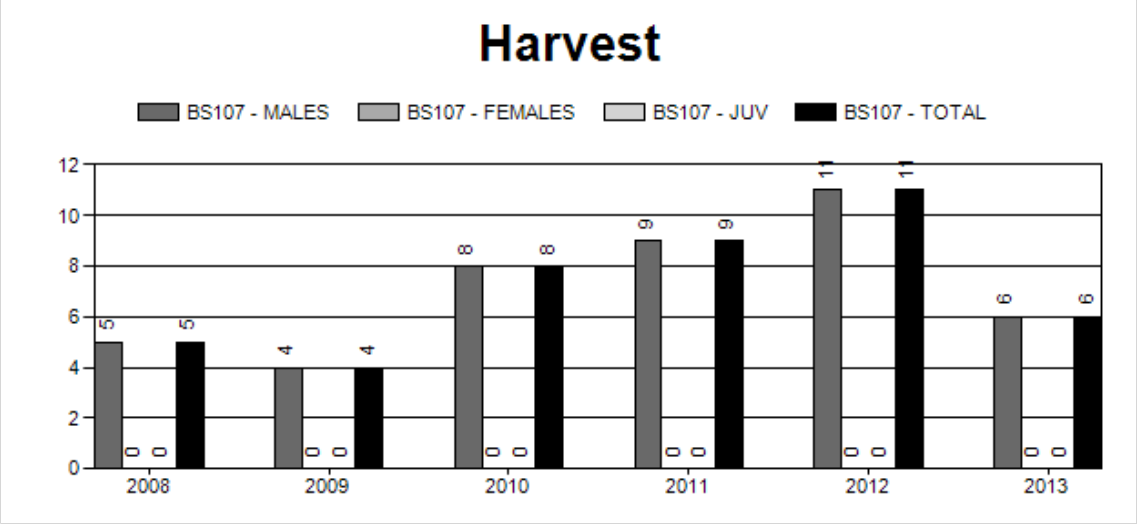
	2008 - 2012 Average	2013	2014 Proposed
Population:	408	350	375
Harvest:	7	6	7
Hunters:	10	7	8
Hunter Success:	70%	86%	88 %
Active Licenses:	10	7	8
Active License Percent:	70%	86%	88 %
Recreation Days:	83	47	75
Days Per Animal:	11.9	7.8	10.7
Males per 100 Females	57	74	
Juveniles per 100 Females	34	33	

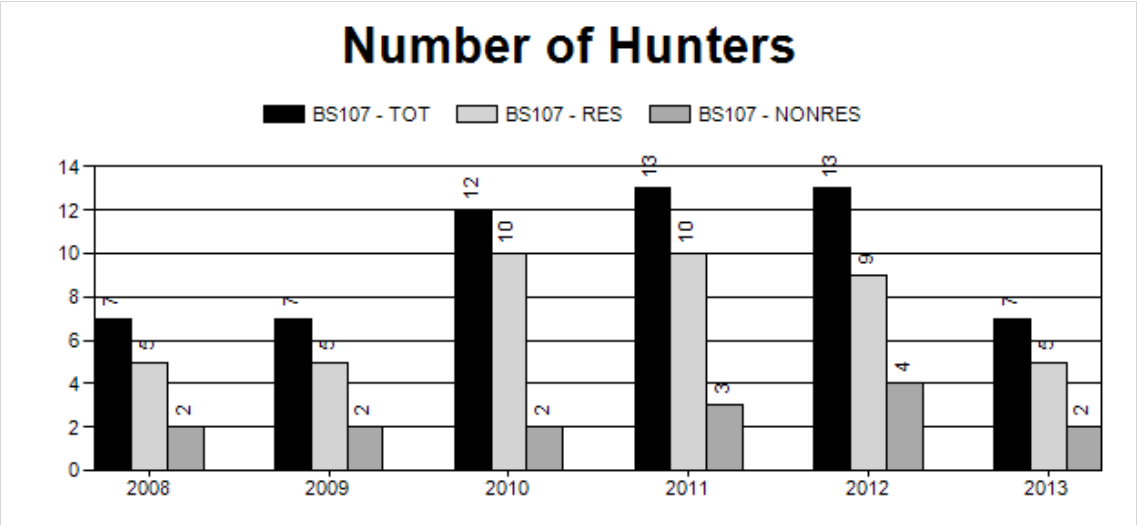
Population Objective:	500
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-30%
Number of years population has been + or - objective in recent trend:	0
Model Date:	None

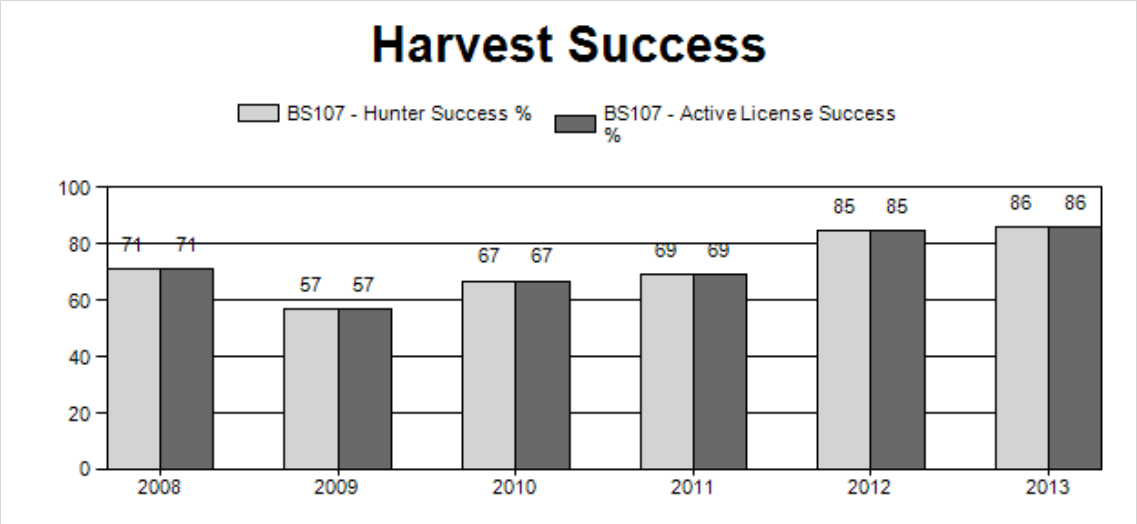
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

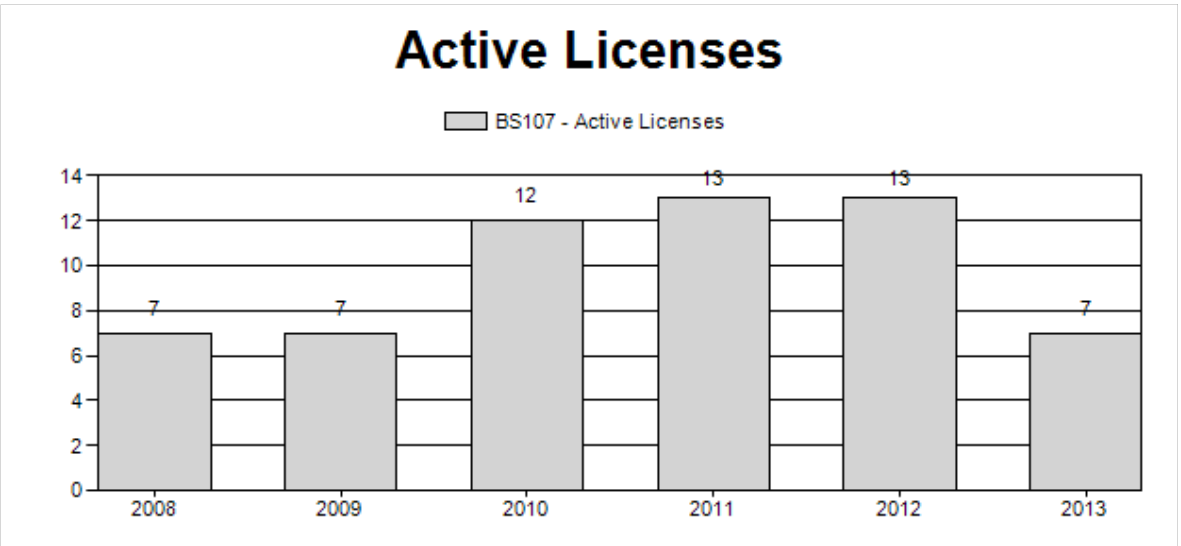
	JCR Year	Proposed
Females ≥ 1 year old:	na%	na%
Males ≥ 1 year old:	na%	na%
Juveniles (< 1 year old):	na%	na%
Total:	na%	na%
Proposed change in post-season population:	na%	na%

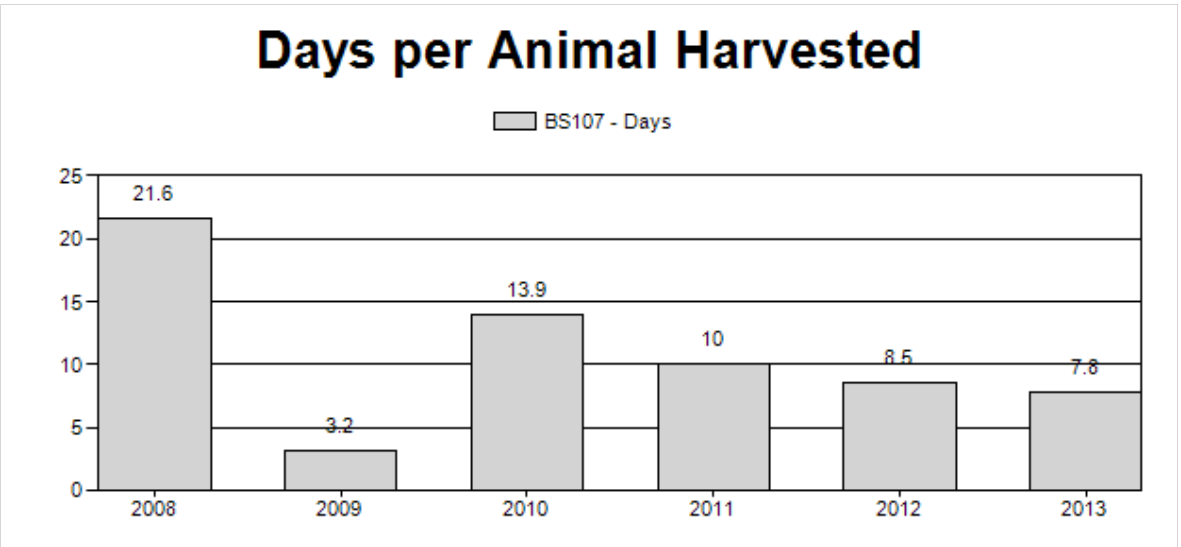


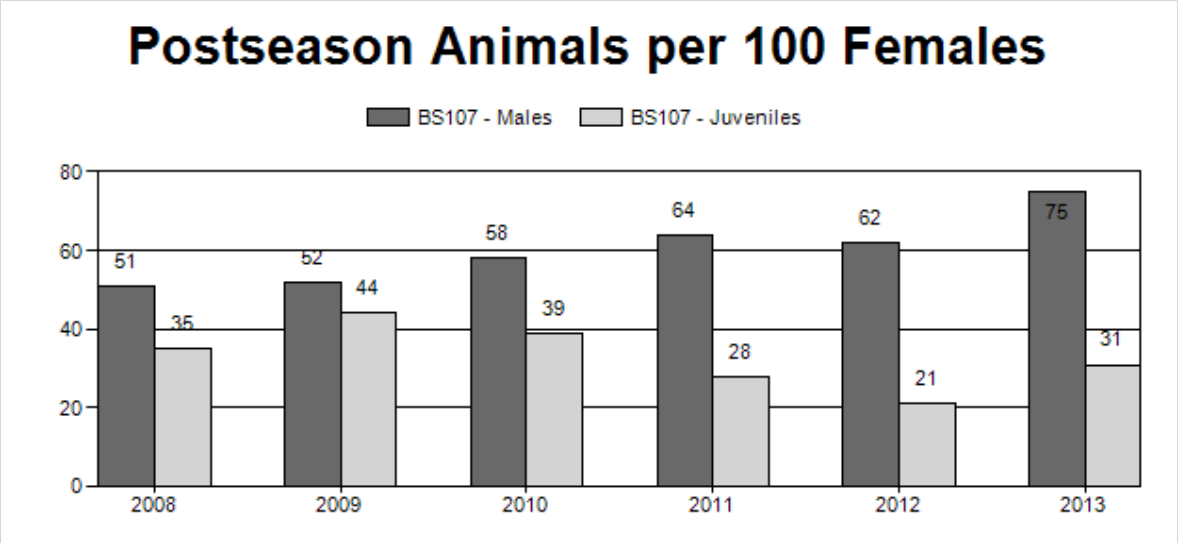

Harvest
BS107 - MALES
BS107 - FEMALES
BS107 - JUV
BS107 - TOTAL
0
2
4
6
8
10
12
2008
2009
2010
2011
2012
2013


Number of Hunters
BS107 - TOT
BS107 - RES
BS107 - NONRES
0
2
4
6
8
10
12
14
2008
2009
2010
2011
2012
2013


Harvest Success
BS107 - Hunter Success %
BS107 - Active License Success %
0
20
40
60
80
100
71 71
57 57
67 67
69 69
85 85
86 86
2008
2009
2010
2011
2012
2013


Active Licenses
BS107 - Active Licenses
14
12
10
8
6
4
2
0
7
7
12
13
13
7
2008
2009
2010
2011
2012
2013


Days per Animal Harvested
BS107 - Days
25
20
15
10
5
0
21.6
3.2
13.9
10
8.5
7.8
2008
2009
2010
2011
2012
2013


Postseason Animals per 100 Females
BS107 - Males
BS107 - Juveniles
80
60
40
20
0
51
35
52
44
58
39
64
28
62
21
75
31
2008
2009
2010
2011
2012
2013

2008 - 2013 Postseason Classification Summary

for Bighorn Sheep Herd BS107 - JACKSON

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	393	30	55	85	28%	166	54%	58	19%	309	277	18	33	51	± 0	35	± 0	23
2009	422	33	68	101	27%	194	51%	86	23%	381	312	17	35	52	± 0	44	± 0	29
2010	423	17	71	88	29%	152	51%	59	20%	299	298	11	47	58	± 6	39	± 4	25
2011	454	18	121	139	33%	217	52%	61	15%	417	349	8	56	64	± 3	28	± 1	17
2012	350	17	65	82	34%	133	55%	28	12%	243	256	13	49	62	± 6	21	± 3	13
2013	350	14	84	98	37%	130	49%	40	15%	268	292	11	65	75	± 6	31	± 3	18

2014 HUNTING SEASONS
JACKSON BIGHORN SHEEP HERD (BS107)

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
7	1	Sep. 1	Oct. 31	8	Limited quota	Any bighorn sheep

Special Archery Seasons

Hunt Area	Dates of Seasons	
	Opens	Closes
7	Aug. 15	Aug. 31

<u>Management Evaluation</u>
Current Postseason Population Management Objective: 500
Management Strategy: Special
2013 Postseason Population Estimate: ~350
2014 Proposed Postseason Population Estimate: ~375

The management objective for the Jackson bighorn sheep herd unit is 500 sheep. Spreadsheet models developed for this herd do not appear to adequately simulate observed trends and therefore managers will develop a proposal using the mid-winter trend count as a benchmark for this population. The objective will be reviewed in 2015.

Herd Unit Issues

This population is well below the post season management objective. The bighorn population likely experienced a pneumonia related die-off in 2002 and again in 2012. An estimated 30% of the population died during the latest pneumonia event. From 2011–2013, over 20 bighorn sheep were radio collared to monitor disease, herd demographics and migrations. There has also been an effort to survey for respiratory pathogens in the herd as a result of the pneumonia outbreak and to date, 26 bighorn sheep have been sampled.

Weather

Following an extremely dry summer and fall in 2012, weather conditions in 2013 were considerably wetter. The area received significant pulses of spring and fall moisture, which improved forage conditions for bighorn sheep and other ungulates. At the time of the mid-winter survey, winter precipitation was reported at 109% of normal. Please refer to the following web sites for specific weather station data. **http://www.ncdc.noaa.gov/temp-and-precip/time-series** and **http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html**

Habitat

The Wyoming Game and Fish Department and Bridger-Teton National Forest (BTNF) initiated a project in 2012 to evaluate the short-term and long-term nutritional changes in bighorn sheep forage after wildfire. This project will track the nutritional content over 10 years of key forage species that burned at different fire severities during the Red Rock Fire in the Gros Ventre. Other than this project, there are no established vegetation transects in this herd unit.

The Bryan Flats Habitat Enhancement and Fuels Reduction Project is scheduled for implementation in fall 2014. This prescribed burn project is led by BTNF and will improve bighorn sheep habitat in the Hoback Canyon area. Please refer to the 2013 Annual Report Strategic Habitat Plan Accomplishments for Jackson Region habitat improvement project summaries **(http://wgfd.wyo.gov/web2011/wildlife-1000708.aspx)**.

Field Data

In the Gros Ventre drainage, approximately 40% of radio collared bighorn ewes died during 2012 and lamb ratios declined from a high of 50 lambs:100 ewes in late June to 15:100 by February 2013. Carcasses retrieved during the summer indicate that sheep likely died from pneumonia. Additional sampling in December and January (N=14) indicated that approximately 70% of the sheep were positive for *Mycoplasma ovipneumoniae*, and nine of the twelve (75%) had leukotoxin positive isolates. *Mannheimia haemolytica*, *Bibersteinia trehalosi*, and *Pasteurella multocida* were also found.

In February 2014, classification surveys were flown over low elevation winter ranges in the Curtis Canyon, Flat Creek and Gros Ventre River areas. High elevation ranges were not surveyed this year. Bighorn sheep on Miller Butte and Camp Creek were classified from the ground. The overall trend in sheep numbers increased from last year's survey of the same areas. A total of 268 sheep were observed including 130 females, 40 lambs, 84 adult males and 14 yearling males. Herd unit ratios were 31 lambs:100 ewes, 65 adult rams:100 ewes and 11 yearling rams:100 ewes. The lamb ratio is higher than last year's ratio of 21:100, suggesting that the pneumonia outbreak may be ending. The low yearling ram ratio is likely due to the low lamb numbers observed in 2012.

Harvest Data

Data from the 2013 harvest survey indicate that 7 hunters harvested 6 rams. On hunter took a medical deferral and plans to hunt in 2014. The median age of harvested rams in 2013 was 8.5 years. The number of licenses was reduced for the 2013 season from 13 to 8 in response to the

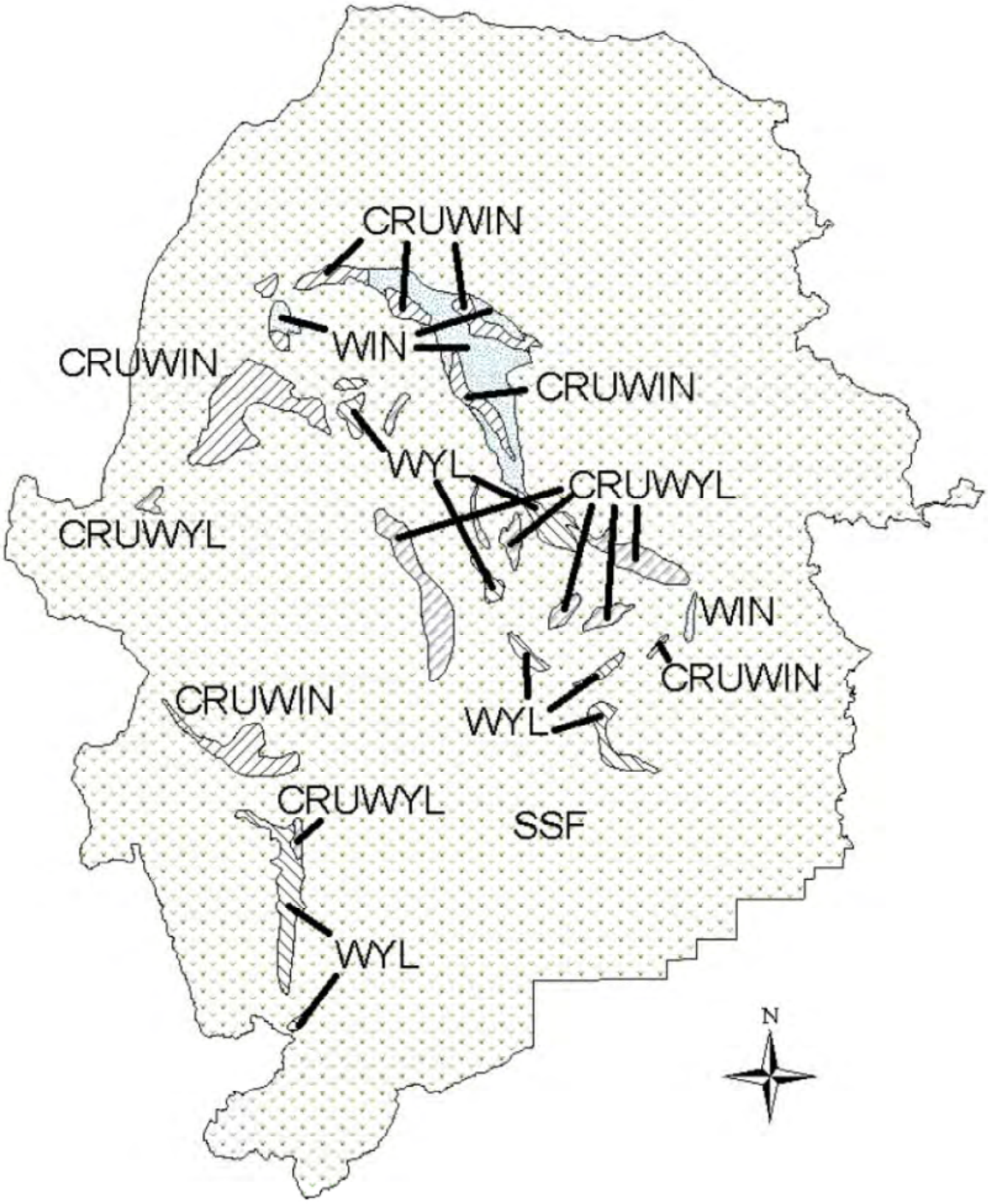
pneumonia outbreak. Based on classification surveys and the number of rams observed in 2014 (n=98), it is likely that this harvest has minimal effect on the overall population, even with the recent pneumonia outbreak. Ram ratios remain high. However given the recent population decline, managers plan to maintain 8 licenses for the 2014 season. If postseason classifications in winter 2015 indicate that the population continues to rebound after the outbreak, additional licenses will be considered.

Population

This population is estimated to be below the post season management objective based on aerial surveys in 2013. Spreadsheet models developed for this herd do not appear to adequately simulate observed trends and therefore managers will develop a proposal using the mid-winter trend count as a benchmark for this population. The observed population trend indicates that this population was approaching winter range densities in 2012 similar to those observed in 2001 just before that pneumonia outbreak.

Management Summary

There will be no changes for the 2014 season. If the lamb:ewe ratio continues to improve next year, additional licenses will be considered. Following the 2002 die-off this population had a three year period of low lamb production. It appears that the population may be rebounding more quickly from the 2012 die-off. The WGFD plans to continue to monitor the population using radio collars and disease sampling in the near future.



BHS107 - Jackson
HA 7
Revised 9/02

2013 Jackson Sheep Monitoring Annual Report
Permit #798

Contact: Doug Brimeyer
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PO Box 67
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307-733-2321
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Project Background

The Jackson bighorn sheep herd experienced a die-off during 2001-2002 in which approximately 50% of the population died. Since then bighorn sheep numbers have rebounded to a level that has again triggered concerns that an environmental event may pre-dispose the population to another pneumonia related die-off. Based on current sheep densities, disease monitoring in the Jackson herd is at a critical stage. During 2010, two male lambs were removed from Russold Hill in early March after it was observed that approximately 10% of the animals wintering on Russold Hill exhibited signs of pneumonia (e.g. coughing, runny nose etc.). Both lambs exhibited minor cases of pneumonia (~15% of lungs affected), but otherwise were in good health with moderate fat stores. The laboratory analysis indicated the two lambs had Mycoplasma ovipneumoniae , although Bibersteinia (Pasteurella) trehalosi (potential pathogen) and Arcanobacterium pyogenes were also identified from lung tissue. Lungworm (Protostrongylus spp.) were also identified from both animals.

Also in 2010, two adult ewes were captured near Camp Creek Inn to monitor sheep movements along the Hoback River. In 2011, eight bighorn ewes were captured on winter ranges north of Jackson and during 2012 ten additional sheep were captured and radio fitted with radio collars. During the 2012 biological year the Kaplan-Meier survival estimate was 78% for radio collared ewes.

Results

During 2013, three additional radio collars were put on adult bighorn sheep ewes bringing the total radio collared sheep to eleven in the study area. Two of these sheep have not been located since June 2013 and one sheep (Sheep 500) was observed last spring with a malfunctioning radio collar. Sheep were captured on Miller Butte, Camp Creek and Lower Gros Ventre areas in 2013.

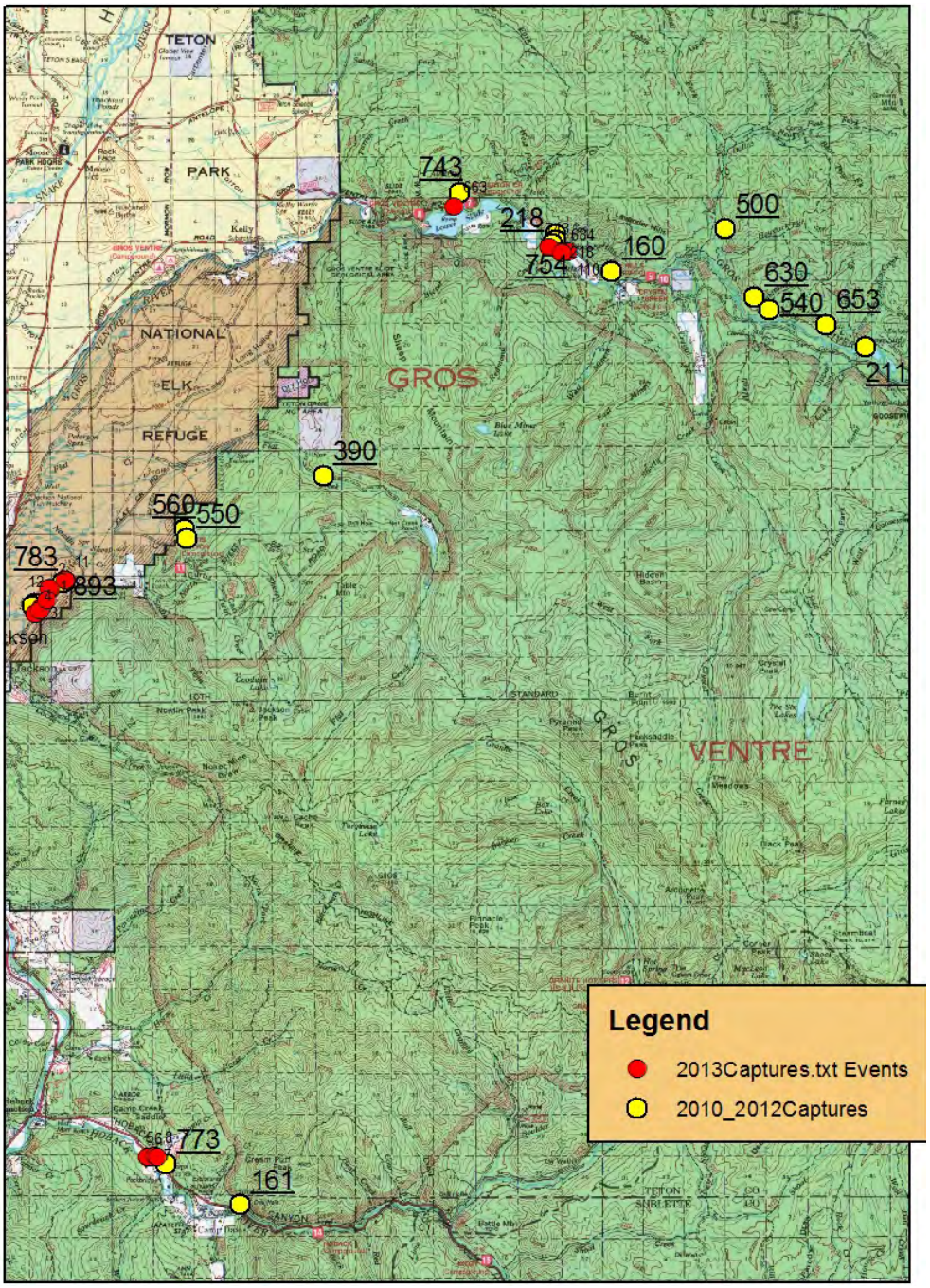


Figure 1. Capture locations for bighorn sheep captured in 2010-2013.

One radio collared sheep died during 2013, sheep 663 (150.550). This sheep died in the Miner Creek drainage and was detected on mortality during a flight on June 7, 2013.

Data from radio collars recovered during 2012 and 2013 were shared with the Greater Yellowstone Area Mountain Ungulate Project. This research is a collaborative research initiative to study the ecology and population dynamics of bighorn sheep and mountain goats throughout the Yellowstone ecosystem

(http://gyamountainungulateproject.com/contact.html). Data were also shared with the Wyoming Migration Initiative at the University of Wyoming.

Table 1. Bighorn sheep frequencies in the Jackson herd.

ID	GPSfreq	VHFFreq	Visibility	Comments	Status last heard
211		***150.263***			12/13/13 Grey Hills
653		***150.352***			1/4/2014
684		***150.482***			not found
743	***150.744***	***150.493***	Yellow #26	New Capture 4/11/13	1/4/2014
893	150.54	150.54		replaced old collar 12/10/12	1/4/2014
390	150.390	150.39	blue**7B**	blue**7B**	not found
630	150.63	150.63	white/yellow**6B**	New Capture Jan2013	1/4/2014
410	150.16	150.16	purple **1B**	Replaced old collar 3/5/13	12/14/13 FlatCk Lot NER
218		150.464	Yellow #27	Experimental GPS replaced with 150.464 on 4/17/13	9-Sep
110	149.11		Yellow #28	Experimental GPS captured on 5/1/13	1/4/2014
500	150.500	150.500	**green2B**	GPS quit transmitting fall 2012?	not found

On January 3 and 4, 2013 a total of twelve sheep were darted to assess herd health on Miller Butte and near Camp Creek Inn (Table 2). Most sheep sampled exhibited low to moderate levels of lung worm in their feces and two that were high (Appendix A). Eight of the twelve sheep (67%) were polymerase chain reaction (PCR) positive for *Mycoplasma ovipneumoniae*. Nine of the twelve (75%) had leukotoxin positive isolates but *Mannheimia haemolytica* was not found by PCR or culture. In early March a lamb was darted and euthanized near Miller Butte exhibiting signs of pneumonia. Laboratory cultures found signs of M. ovipneumonia and B. trehalosion. Low lungworm counts were found in the feces. Also in March an adult ram was euthanized near Camp Creek after becoming entangled in a fence. Culture results were similar to the other sheep sampled in 2012 (Appendix A).

During June reproduction surveys, one of three radio collared ewes were observed with a lamb and 44 ewes were observed with 7 lambs. Overall Kaplan-Meier adult survival was estimated at 92% (censoring unfound sheep 390, 500 and 684) during the 2013 biological year. Additional effort will be made during mid winter big game flights to observe missing radio collared sheep.

Table 2. Bighorn sheep captures during 2013.

ID	GPSfreq	VHFFreq	Visibility	CaptureDate	LocationEast	Location Northing	Comments
110	149.11		Yellow #28	5/1/2013	542339	4829978	New Capture Experimental GPS
218		150.464	Yellow #27	4/17/2013	542055	4829980	Recapture replace experimental GPS with a VHF collar 150.464
743	***150.744***	***150.493***	Yellow #26	4/11/13	541631	4830164	New Capture
684		150.482		3/7/2013	542091	4829922	Remove GPS collar
410	150.16	150.16	purple **1B**	3/5/2013	521690	4815961	Removed Faulty GPS
663	150.55	150.55	pink**4B**	2/21/2013	537939	4831747	Removed Faulty GPS
1	-	-	-	1/3/2013	522305	4816925	Disease Sampling Miller Butte
2	-	-	-	1/3/2013	522264	4816965	Disease Sampling Miller Butte
3	-	-	-	1/3/2013	521927	4816176	Disease Sampling Miller Butte
4	-	-	-	1/3/2013	521717	4815961	Disease Sampling Miller Butte
5	-	-	-	1/3/2013	526139	4794950	Disease Sampling Camp Creek
6	-	-	-	1/3/2013	526043	4794931	Disease Sampling Camp Creek
7	-	-	-	1/4/2013	526339	4794989	Disease Sampling Camp Creek
8	-	-	-	1/4/2013	526413	4794962	Disease Sampling Camp Creek
9, 10	-	-	-	1/4/2013	521875	4816109	Disease Sampling Miller Butte
11	-	-	-	1/4/2013	522860	4817264	Disease Sampling Miller Butte
12	-	-	-	1/4/2013	522132	4816508	Disease Sampling Miller Butte

Discussion

Mortality rates observed in 2013 were lower compared to 2012 and it is likely that the pneumonia related die-off observed in 2012 has ended. Initial lamb:ewe ratios observed during summer surveys suggest reduced reproduction. Primary project objectives include collecting migration and disease information on the various wintering segments of the Jackson sheep herd. Radio collars on sheep captured in January 2012 will release March 15, 2014. An analysis of seasonal distribution and migration will be completed once the radio collars are retrieved. Preliminary monitoring indicates radio collared sheep from the NER used summer ranges north of Flat Creek and the sheep from the Gros Ventre moved to higher elevations north of Flat Creek and Crystal Creek. Bighorn sheep collared east of the NER spent summers south of Granite Creek near Pinnacle Peak.

During 2014 additional captures are proposed to evaluate the presence of disease and to continue monitoring animal movement patterns.

Appendix A 2013 Bighorn sheep Samples

ID	Species	Larvae	Rate	Larvae Species	Submitted	Comments
1	Bighorn	1778	larvae/gram	Protostrongylus sp	1/7/2013	
2	Bighorn	168	larvae/gram P	rotostrongylus sp	1/7/2013	
3	Bighorn	230	larvae/gram P	rotostrongylus sp	1/7/2013	
4	Bighorn	194	larvae/gram P	rotostrongylus sp	1/7/2013	
5	Bighorn	860	larvae/gram P	rotostrongylus sp	1/7/2013	
6	Bighorn	677	larvae/gram P	rotostrongylus sp	1/7/2013	
7	Bighorn	176	larvae/gram P	rotostrongylus sp	1/7/2013	
8	Bighorn	1223	larvae/gram	Protostrongylus sp	1/7/2013	
9	Bighorn	131	larvae/gram	Protostrongylus sp	1/7/2013	
10	Bighorn	682	larvae/gram	Protostrongylus sp	1/7/2013	
11	Bighorn	88	larvae/gram	Protostrongylus sp	1/7/2013	
12	Bighorn	468	larvae/gram	Protostrongylus sp	1/7/2013	
2775	Bighorn	353	larvae/gram	Protostrongylus sp	3/8/2013	6F030813
3379	Bighorn	1464	larvae/gram	Protostrongylus sp	3/18/2013	Camp Crk Fence mortality
4940	Bighorn	542	larvae/gram	Protostrongylus sp	4/15/2013	
5241	Bighorn	163	larvae/gram	Protostrongylus sp	4/18/2013	150.465
6343	Bighorn	98	larvae/gram	Protostrongylus sp	5/3/2013	Sheep110

Animal ID's	Media	Culture Results *	PCR Results
1		NSI**	M.ovi
2		NSI	M.ovi
3		NSI	ND
4		NSI	M.ovi
5		NSI	M.ovi
6		NSI	ND
7		NSI	M.ovi
8		NSI	M.ovi
10		NSI	M.ovi
		NSI	
11		NSI	M.ovi
12		NSI	ND
14		NSI	ND

Animal ID's	Media	Culture Results *	PCR Results
1		+ 2 B. trehalosi	B.trehalosi Lkt +
2		+ 2 B. trehalosi	ND
3		+ 2 B. trehalosi	ND
4		+ 1 B. trehalosi, +2 P. multocida	B.trehalosi Lkt +
5		+ 2 B. trehalosi, +2 P. multocida	ND
6		+ 2 B. trehalosi	Mannheimia species Lkt +, B.trehalosi Lkt +
7		+ 1 B. trehalosi, +2 P. multocida	B.trehalosi Lkt +
8		+ 1 B. trehalosi, +1 P. multocida	Mannheimia species Lkt +, B.trehalosi Lkt +
10		+ 2 B. trehalosi, +1 P. multocida,	Mannheimia species Lkt +, B.trehalosi Lkt +
		+1 Mannheimia	
11		+ 2 B. trehalosi	ND
12		+ 2 B. trehalosi	Mannheimia species Lkt +, B.trehalosi Lkt +
14		+ 2 B. trehalosi	B.trehalosi Lkt +

Accession: GF030813/13W2775
Submitter: D. Brimeyer
Date Recei 3/8/2013

Animal ID's	Media	Culture Results *	PCR Results
Tonsil	CBA	+2 B. trehalosi	No Lkt detected
Nasal 1	mod TSB-1	NSI	M.ovi
Nasal 2	mod TSB-1	+1 M. ovipneumoniae	M.ovi

Accession: GF031913
Submitter: D. Brimeyer
Date Recei 3/19/2013

Animal ID's	Media	Culture Results *	PCR Results
T1	CBA	+2 B. trehalosi	Lkt + Mannheimia species
T2	CBA	+2 B. trehalosi	Lkt + Mannheimia species

Animal ID's	Media	Culture Results *	PCR Results
N1	Mod TSB-1	NSI	M.ovi
N2	Mod TSB-1	NSI	M.ovi

Accession: GF041213/13W4940
Submitter:
Date Received:

Pasteurella

Animal ID's	Media	Culture Results Sheep*	Culture Results Hotel*	PCR Results
13-21	CBA	B. trehalosi, heam. B. tre.	B. trehalosi	Lkt-
Mycoplasma				
Animal ID's	**Media**	**Culture Results Lab**		**PCR Results**
13-21	mod-TSB1	NSI		ND

Accession: 6343
Submitter:
Date Received:

Animal ID's	Media	Culture Results *	PCR Results	Comments
110-T-1		Mannheimia spp.	Lkt+, not M. haem	Likely M. glucosida
110-T-2				
110-N-1	mod TSB-1	NSI	ND	
110-N-1	mod TSB-1	NSI	ND	

* Culture ranked on amount of significant growth +1 (1-10 colonies), 2+ (11-100 colonies), +3 (101-300 colonies), +4 (>300 colonies)

NSI = no significant isolates
ND = not detected

2013 - JCR Evaluation Form

SPECIES: Mountain Goat
HERD: MG101 - PALISADES
HUNT AREAS: 2

PERIOD: 6/1/2013 - 5/31/2014

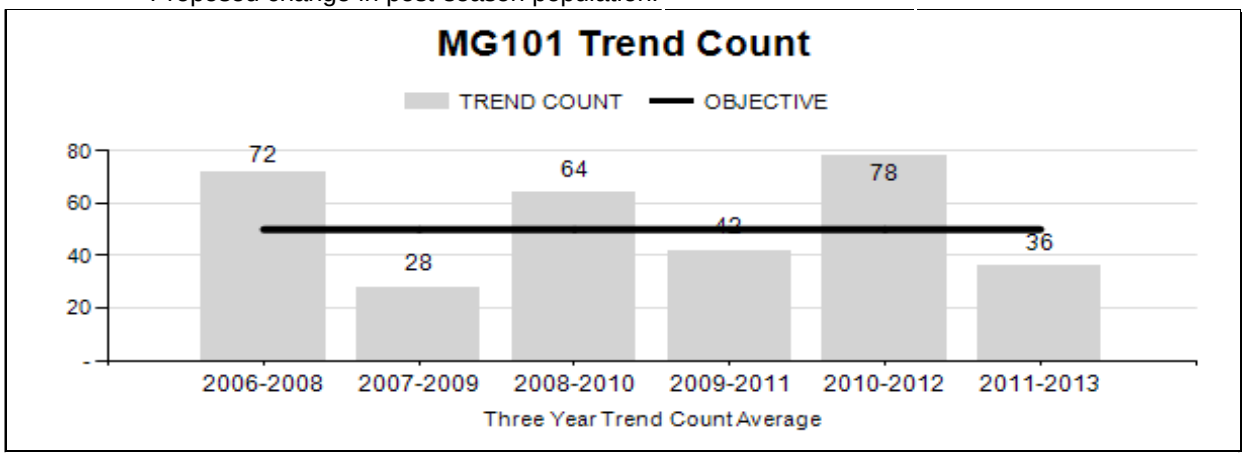
PREPARED BY: GARY FRALICK

	2008 - 2012 Average	2013	2014 Proposed
Trend Count:	60	0	120
Harvest:	7	7	7
Hunters:	8	8	8
Hunter Success:	88%	88%	88%
Active Licenses:	8	88%	8
Active License Percentage:	88%	88%	88%
Recreation Days:	29	78	57
Days Per Animal:	4.1	11.1	8.1
Males per 100 Females:	0	0	
Juveniles per 100 Females	29	0	

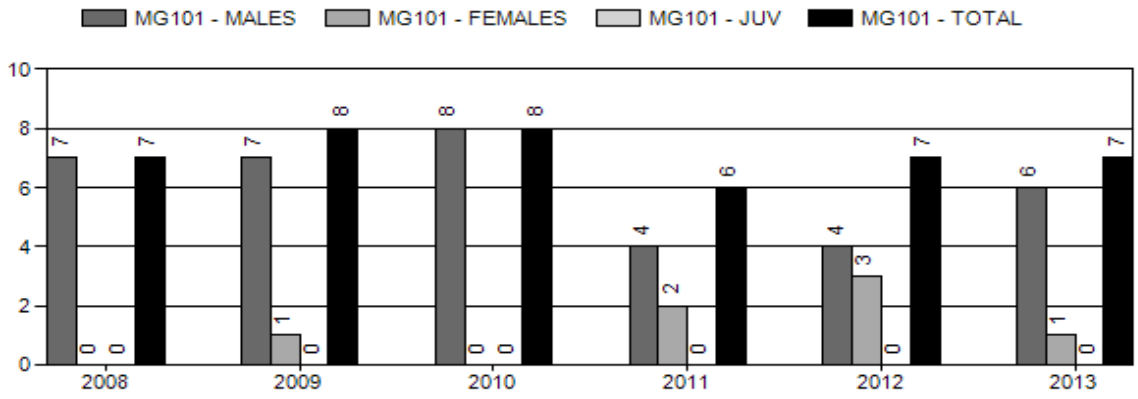
Trend Based Objective (± 20%)	50 (40 - 60)
Management Strategy:	Recreational
Percent population is above (+) or (-) objective:	N/A%
Number of years population has been + or - objective in recent trend:	10

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

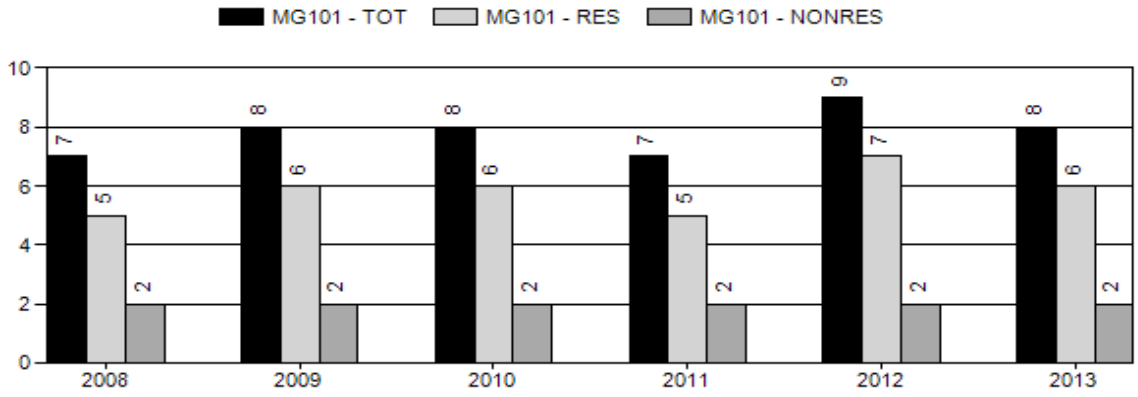
	JCR Year	Proposed
Females ≥ 1 year old:	NA%	NA%
Males ≥ 1 year old:	NA%	NA%
Juveniles (< 1 year old):	NA%	NA%
Total:	NA%	NA%
Proposed change in post-season population:	NA%	NA%



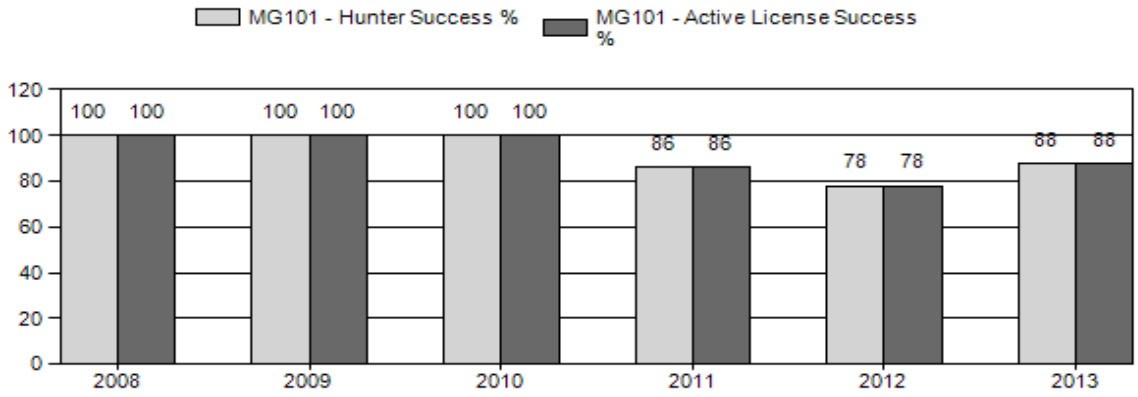
Harvest



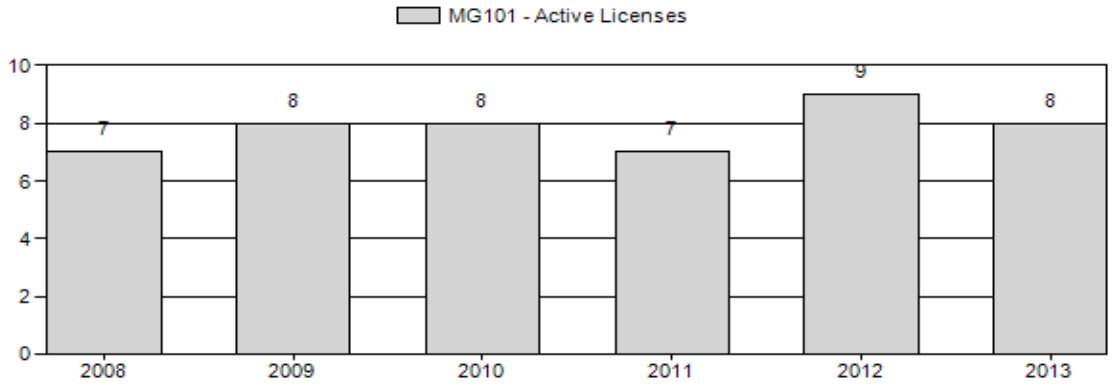
Number of Hunters



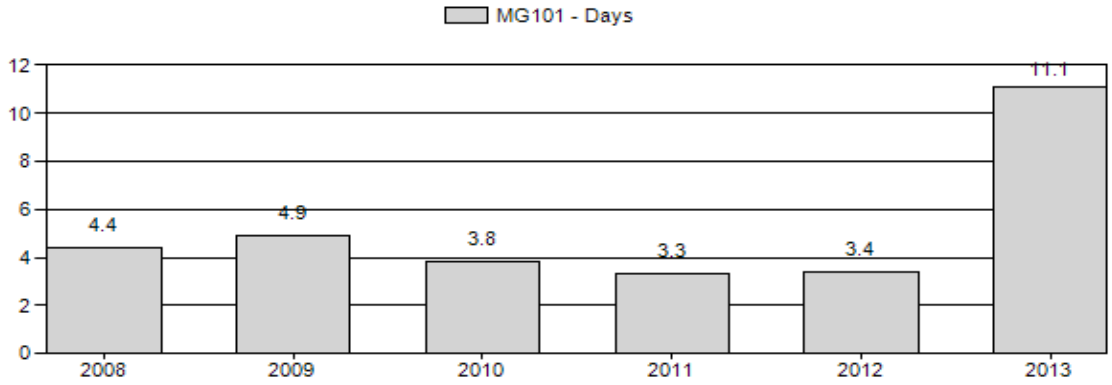
Harvest Success



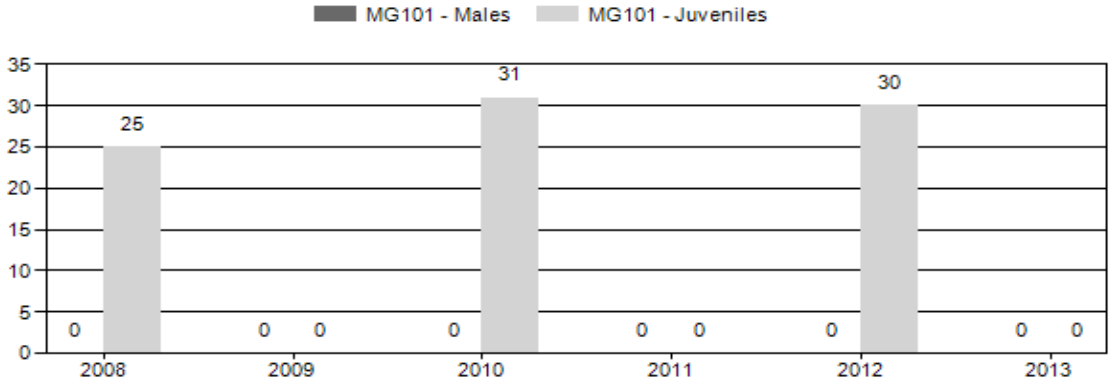
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2008 - 2013 Preseason Classification Summary

for Mountain Goat Herd MG101 - PALISADES

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	100	0	0	0	0%	52	80%	13	20%	65	82	0	0	0	± 0	25	± 0	25
2009	100	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2010	140	0	0	0	0%	97	76%	30	24%	127	0	0	0	0	± 0	31	± 0	31
2011	130	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2012	130	0	0	0	0%	83	77%	25	23%	108	0	0	0	0	± 0	30	± 0	30
2013	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0

2014 HUNTING SEASON

SPECIES: MOUNTAIN GOAT **HERD UNIT: PALISADES (MG101)**

HUNT AREA	TYPE	OPENS	CLOSES	QUOTA	LIMITATIONS
2		Sept. 1	Oct. 31	8	Limited quota; any goat
		Aug. 15	Aug. 31		Limited quota; Archery only; Refer to Section 4

Management Evaluation

Current Mid-Winter Trend Count Management Objective: 50
Management Strategy: Recreational
2013 Mid-Summer Trend Count: NA
Most Recent 3-year Running Average Trend Count: 40

The Palisades mountain goat population objective is 50 goats. Management strategy is recreational. The population objective was established in 1999. The 2012 mid-summer trend count was 108 goats. The three-year average mid-summer trend count is 36 goats. This population has exceeded the objective over the last 10 years. The next mid-summer trend count will be conducted in 2014. The population objective will be reviewed in 2015.

Herd Unit Issues

To ensure the long-term welfare of this population, Idaho and Wyoming have committed to a cooperative management effort that entails sharing population data, coordinating habitat management projects, and surveying the entire goat population concurrently every two years. Management goals of the Wyoming subpopulation have focused on maintaining a conservative

hunting approach through the annual issuance of 4 - 8 licenses valid for any goat since 1999. This approach has resulted in a high degree of hunter satisfaction, exceptionally high hunters success and low days/animal harvest statistics, and trophy class males being taken in most years since the hunt was initiated in 1999.

Mountain goats have dispersed in national forest system lands west of west of Grand Teton National Park. In an effort to provide additional hunting opportunity the Department has expanded the area to hunt mountain goats to Area 2 licenses holders in 2014. The west slope of the Tetons, on National Forest System Lands, will be open to the hunting of mountain goats in 2014.

This cooperative management approach expanded in 2013 to include the Greater Yellowstone Area Mountain Ungulate Project. The Greater Yellowstone Area Mountain Ungulate Project is a collaborative research initiative to study the ecology and population dynamics of bighorn sheep and mountain goats throughout the Yellowstone ecosystem http://gyamountainungulateproject.com/contact.html.

Concurrent with the relatively conservative management is a lack of knowledge associated with interstate movements, distribution, reproductive success, and fecundity. Moreover, since goats in Wyoming have never been exposed to herd specific research and monitoring efforts, the opportunity to initiate a baseline herd health monitoring effort is warranted. This initial effort to assess herd health will focus on determining the presence and persistence of disease and parasites in a substantial segment of the Palisades goat herd that inhabits Wyoming.

Mountain goats have dispersed into Grand Teton National Park, and adjacent Wyoming bighorn sheep hunt areas 6, 7, 8, and 24. Mountain goat dispersal into these areas may present other management challenges in the future.

Greater Yellowstone Area Mountain Ungulate Project:

Project Objectives

Project objectives include: collecting migration information on segments of the Palisades mountain goat herd, documenting any interstate movements of collared goats, determining the presence of *Mannheimia* sp., *Mycoplasma* sp. and other pathogens that may potentially be transmitted to bighorn sheep; monitor herd health during the winter.

Scientific Merit/Management Relevance

Disease monitoring in mountain goat is critical, especially in those herds where little or no monitoring information has been collected. The Palisades herd is believed to be the source herd of dispersing mountain goats in western Wyoming. This population and occupies active domestic sheep allotments there is the potential that mountain goats harbor infectious diseases that are potentially lethal to bighorn sheep.

Weather

Weather conditions during the 2013 were extremely dry during the early portion of the summer. By late summer the moisture regime had changed frequent precipitation scenario that persisted into the fall hunting season. Drought conditions in the early portion of the summer abated by late fall as persistent snow storms began to deposit snowpack in the Snake River Mountain Range. By late winter 2014 snowpack in western Wyoming watersheds were estimated to be well-above normal. Please refer to the following web sites for specific weather station data: http://www.ncdc.noaa.gov/temp-and-precip/time-series and **http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html** .

Habitat

No habitat data has been collected on goat summer and winter ranges. There are no established vegetation transects in this herd unit. Please refer to the 2012 Annual Report Strategic Habitat Plan Accomplishments, pages 61-77 for Jackson Region habitat improvement project summaries (http://wgfd.wyo.gov/web2011/wildlife-1000708.aspx).

Harvest

The 2013 hunting season was the 15th year that goats were hunted in Area 2. A total of eight (8) licenses were issued; seven goats were harvested. A total of six (6) billies and one (1) nanny were harvested in 2013. Since 1999, a total of 89 mountain goats (77 billies, 12 nannies) have been harvested in Hunt Area 2. A population model has never been developed for this mountain goat population because of the small size of the herd.

Population

The population is trending towards a stable population that is above the objective. The population objective will be reviewed in 2015. A population model has not been developed because of the small size of this population.

Summer aerial surveys were conducted from a helicopter. These surveys are coordinated with Idaho Department of Fish and Game to ensure this interstate population is surveyed concurrently. Surveys are initiated every biennial. The helicopter surveys were first initiated in August 1997. Subsequent surveys were conducted in 1998, 2000, 2002, 2004, 2006, 2008, 2010, and 2012 (Appendix A). In 2006, a total of 130 goats were counted in Wyoming. This was a slight increase from the 121 goats counted in 2004. The total number of goats counted in 2010 and 2012 in Wyoming was 127 goats and 108 goats, respectively. Comprehensive winter surveys were not conducted in February 2007 - 2013. This population may have attained its reproductive potential as well as habitat carrying capacity as kid:adult ratios have been observed below 30 kids:100 adults since 2002.

Mountain goats continue to expand into areas beyond the hunt area boundary. It is believed the predominate individual dispersers are billies, as no evidence of mountain goat reproduction has been observed in the Salt Range, Wyoming Range, or Gros Venre Range. However, mountain

goats are successfully reproducing within the boundaries of Grand Teton National Park. These dispersing individuals will be noted as necessary, and when sufficient goats are consistently and regularly documented, and occur at numbers that may sustain hunting seasons over the long term, a hunting season may be developed.

Management Summary

A total of eight (8) licenses, valid for any goat, will be issued in 2014. The season will run September 1 – October 31. The number of licenses will remain at eight in response to the number of goats observed in August 2012 in Wyoming, and the generally low percentage (13%) of reproductive age nannies harvested since the hunt was initiated in 1999. The size of the hunt area will expand in 2014 in an effort to harvest goats that have dispersed from the Palisades herd into the Teton Range. The area will expand to include a portion of the national forest north of U.S. Highway 22. The increased hunt area size will provide additional hunter recreation.

A total of eight (8) goats are projected in the 2014 harvest. The anticipated harvest will consist of 7 billies, and one (1) nanny. Based on the projected harvest, the posthunt population should remain near 120 goats.

Appendix A.
SNAKE RIVER MOUNTAIN RANGE
MOUNTAIN GOAT POPULATION SURVEYS
IDAHO/WYOMING

Idaho Summary of Mountain Goat Surveys in Unit 67 South of Palisades Creek, 1982-Present (Mt. Baird area).

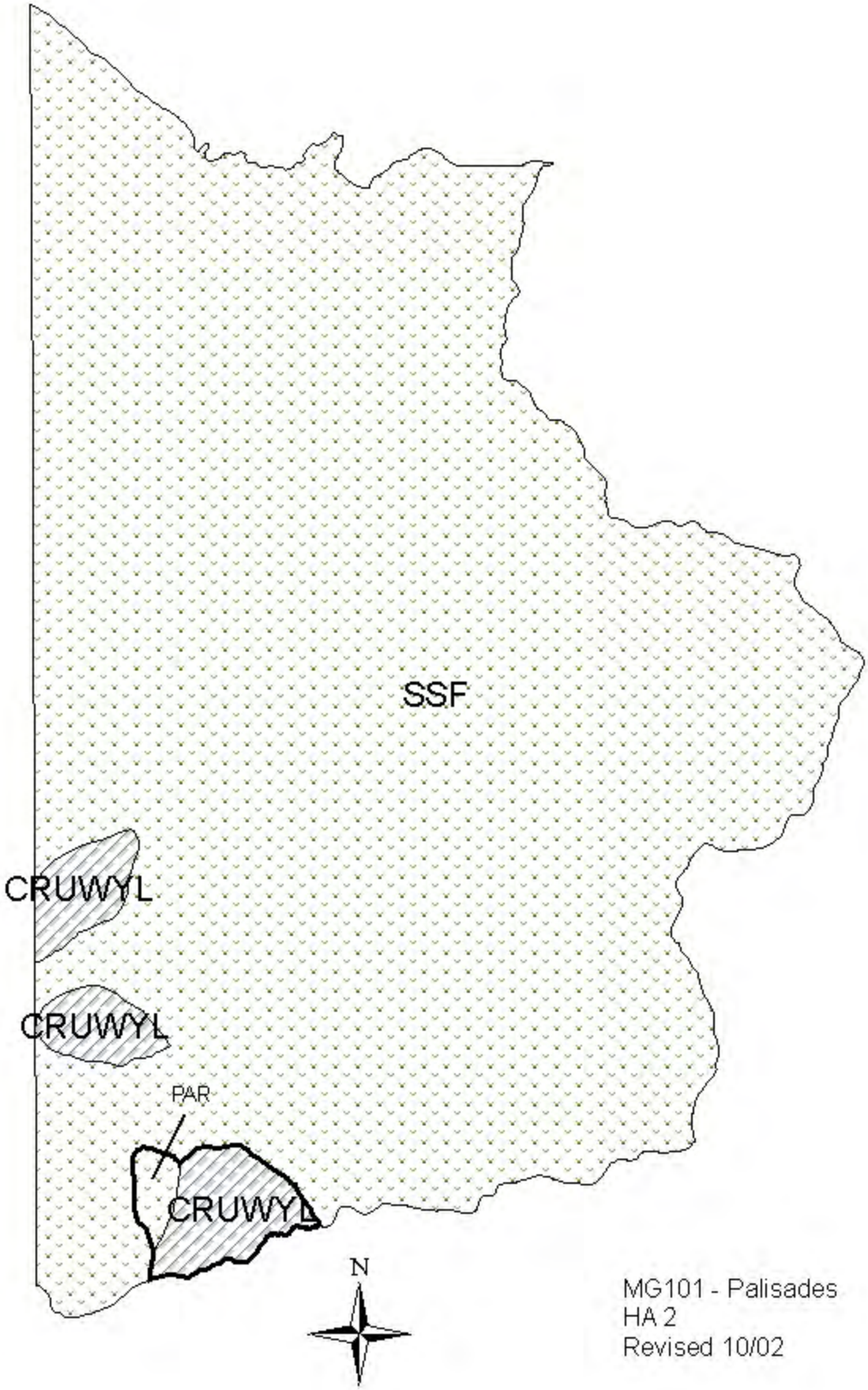
Year	Hunt Area	Inclusive Location	Adults	Kids	Unknown	Total	Ratio Kid:100 Adult
1982[a]	67-1	South of Palisades	33	13	0	46	39
1985[a]		Creek to ID./WY.	35	16	0	51	46
1986[b]		Stateline	0	0	104	104	--
1986[a]			37	15	0	52	41
1988[b]			71	21	0	92	30
1990[b]			45	18	0	63	40
1993[b]			104	33	16	153	34
1994[a]			73	42	0	115	58
1996[a]			151	66	0	217	44
1998[a]			118	45	0	163	38
2000[a]			61	29	0	90	48
2002[a]			35	7	0	42	20
2004[a]			83	24	0	107	29
2006[a]			103	19	0	122	18
2008[a]			96	27	0	123	28
2010[a]			96	33	0	129	34
2012[a]			87	23	0	113	26

Wyoming Summary of Mountain Goat Surveys, Hunt Area 2, Palisades Goat Herd, 1996-Present

Year	Hunt Area	Inclusive Location	Adults	Kids	Unknown	Total	Ratio Kid:100 Adult
1996[a]	2	Wyoming – Palisades	16	8	0	24	50
1997[a]		Goat Herd	34	20	0	54	59
1998[a]			47	15	0	62	32
2000[a]			58	18	0	76	31
2002[a]			37	17	0	54	46
2004[a]			90	31	0	121	34
2006[a]			98	32	0	130	33
2008[a]			52	13	0	65	33
2010[a]			97	30	0	127	31
2012[a]			83	25	0	108	30

[a] Helicopter survey (August).
[b] Ground count.

HERD UNIT SEASONAL RANGE MAP



Population characteristics, movements, and disease surveillance in the Palisades mountain goat herd, Wyoming

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Population characteristics, movements, and disease surveillance in the Palisades mountain goat herd, Wyoming

INTRODUCTION

Historical mountain goat distribution (*Oreamnos americanus*) has been recorded from Alaska and the Yukon southward to the Sawtooth Range of Idaho. Research by Irby and Chezgrall (1994) have reported, based on historical accounts from the 1800s, that mountain goat distribution occurred in areas south of 40 degrees N Latitude in the Colorado Rocky Mountains. In areas where goats have been extirpated or non-existent, transplants have been used successfully to reintroduce goats into former historic or unoccupied range and augment native populations.

Prior to 1987, the state of Idaho released a total of 55 mountain goats at three locations in Idaho identified as Lake Pend Oreille in northern Idaho (releases made 1960, 1968), in the Seven Devils Range of western Idaho (1962, 1974), and the Snake River Range in southeastern Idaho (1969-1971) (Hayden, 1990).

During the period between July 1969 and 1971, the Idaho Department of Fish and Game transplanted 5 female and 7 male goats into the Snake River Range (Hayden 1989). This population increased during the next 10 years to a level that wildlife managers believed could sustain a limited harvest in 1981.

Mountain goats have since dispersed into Wyoming since the initial transplant occurred in Idaho. Department personnel, hunters, and outfitters have documented goats in the Snake River Range and in other areas outside of the core area. As a result of these observations, Hunt Area 2 was

created with a population objective of 50 goats in 1994 in order to address an expanding goat population and to provide hunting opportunity in Wyoming. Summer trend counts conducted from helicopters have been the most efficient and successful method to assess population distribution and growth. The initial aerial survey was conducted in August, 1996; 24 goats were observed. The most current surveys, completed in 2010 and 2012 documented 127 and 108 goats in Wyoming, respectively.

To ensure the long-term welfare of the population Idaho and Wyoming have committed to a cooperative management effort that entails sharing population data, coordinating habitat management projects, and surveying the entire goat population concurrently every two years. Management goals of the Wyoming subpopulation have been focused on maintaining a conservative hunting approach through the annual issuance of 4 - 8 licenses valid for any goat since 1999.

Concurrent with this relatively conservative management approach is a comprehensive absence of knowledge associated with interstate movements, distribution, and reproductive success and fecundity. Moreover, since goats in Wyoming have never been exposed to herd specific research and monitoring efforts, the opportunity to initiate a baseline herd health monitoring effort is warranted. This initial effort to assess herd health will focus on determining the presence and persistence of disease and parasite loadings in a substantial segment of the Palisades goat herd that inhabits Wyoming.

Mountain goats have dispersed into Grand Teton National Park, and adjacent Wyoming bighorn sheep hunt areas 6, 7, 8, and 24. Mountain goat dispersal into these areas may present the potential to transmit diseases to bighorn sheep. This heightened potential for mountain goat to bighorn sheep disease transmission is a result of the Palisades goat population occupying areas where domestic sheep are grazed. In order for managers to assess disease transmission risk from goats to bighorn sheep this initial surveillance effort must be initiated in spring 2013 when goats are concentrated in areas where capture is likely.

Project Objectives

Project objectives include: collecting migration information on segments of the Palisades mountain goat herd, documenting any interstate movements of collared goats, assessing juvenile production and recruitment, determining the presence of *Mannheimia* spp. and *Mycoplasma* spp. and other pathogens that may potentially be transmitted to bighorn sheep, and monitor herd health during the winter.

Project Goals and Analysis

Goals of the project include capturing up to 20 mountain goats (2+ years of age) on winter ranges in the Palisades mountain goat herd. Biological samples will be collected to determine the presence of *Mannheimia haemolytica* and *Mycoplasma ovipneumoniae*. Radio-collars and colored, alpha-numerically labeled neck bands will be placed on female goats. Migration data will be collected on collared animals and WGFD Veterinary Services personnel will collect culture samples to determine the presence of pneumonia and evaluate herd health.

Scientific Merit/Management Relevance

Disease monitoring in mountain goat is critical, especially in those herds where little or no monitoring information has been collected. The Palisades herd is believed to be the source herd of dispersing mountain goats in western Wyoming. This population occupies active domestic sheep allotments. There is the potential that mountain goats harbor infectious diseases that are lethal to bighorn sheep.

Migration, interstate movements, and summer distribution data will be important for managers to document and evaluate.

MOUNTAIN GOAT DISTRIBUTIUON AND CAPTURE OPERATIONS

During late winter and early spring mountain goats occupy south exposures in search of emergent herbaceous vegetation in the Snake River Canyon, east of Alpine, Wyoming. These aggregations may exceed 60 mountain goats; and, often goats present themselves in relative close proximity to U.S. Highway 26/89.

Capture operations were initiated when goats were observed immediately adjacent to U.S. Highway 26/89, and when environmental conditions assured a capture event could be safely executed.

Mountain goats were typically darted at a distance of 18.3 meters (20 yards) or less under free ranging conditions, or from a vehicle if goats were present adjacent to the highway right-of-way. Mountain goats were immobilized with a dosage of 0.75 ml of thiafentanil deployed from a CO_2 Pneu-dart projector.

Immobilized goats were blindfolded and positioned in sternal recumbency; hollow, rubber horn sheaths were placed over the horns to protect handlers from injury during the collection of biological samples. Body temperature and breathing were monitored during anesthesia. Biological samples of blood, feces, and nasal/tonsil/ear-mite swabs were collected.

Ear-tags and VHF and GPS radio-collars were affixed to female goats; males were ear-tagged. The age of each goat was determined through replacement and eruption of lower incisors and by counting horn annuli.

Mountain goats were retained for approximately 20-25 minutes to collect biological samples. The antagonist, Naltrexone, was administered at a dosage of 5 ml. Goats were ambulatory within 2:15 minutes after administration of the antagonist.

RESULTS

Survival

A total of four mountain goats were captured in April 2013 (Table 1). Three (n=3) females were outfitted with Telonics VHF and GPS radio-collars; the male goat was ear-tagged and released. The ages of the female goats were recorded as 4, 5, and 7 years of age, respectively. The male goat was 2-years old. Goats were re-located post-capture to determine status (Table 1). As of January 7, 2014 all radio-collared goats were known to be alive. There was one capture-related morality. A 4+-year old female goat was lost during capture operations on April 8, 2013.

Table 1. A summary of mountain goat captures and survival in the Palisades mountain goat herd, Wyoming, April - October 2013, January 2014.

			Capture Location				Relocation Efforts to Determine Status					
Freq	Ear Tag	Capture Date	Easting	Northing	Sex	Age	2-May-13	27-Jun-13	12-Aug-13	16-Sep-13	6-Oct-13	7-Jan-14
152.62	16	14-Apr	500,952	4,780,652	Female	7	Alive	No Signal	No Signal	No Signal	Alive	Alive
152.65	14	17-Apr	501,414	4,780,609	Female	5	No Signal	Alive	Alive	Alive	Alive	Alive
152.67	18	9-Apr	501,400	4,780,614	Female	4	Alive	Alive	Alive	Alive	Alive	Alive
NA	12	10-Apr	500,037	4,780,141	Male	2						
Mort.		8-Apr	500,071	4,780,958	Female	4						

Disease Surveillance

The biological samples collected during the 2013 captures resulted in a preliminary diagnostic assessment of disease prevalence and persistence of parasite loads for a segment of the Palisades goat population that inhabitats the winter ranges in the Snake River Canyon (Table 2). The primary disease concern was the presence of *Mannheimia haemolytica* and *Mycoplasma ovipneumoniae* in this goat population. Additional diagnostic assays were completed to determine the presence of *Pasteurella* spp. and *Psoroptes* spp.

Table 2. A summary of disease and parasite prevalence in mountain goats in the Palisades mountain goat herd, Wyoming, 2013.

					Presence/Absence of Disease or Parasite			
Frequency	**Ear Tag**	**Capture Date**	**Sex**	**Age**	***Mannheimia haemolytica***	***Mycoplasma ovipneumoniae***	***Pasteurella spp.***	***Psoroptes spp.***
152.62	**16**	**14-Apr**	**Female**	**7**	**Negative**	**Negative**	**Negative**	**Negative**
152.65	**14**	**17-Apr**	**Female**	**5**	**Negative**	**Negative**	**Negative**	**Negative**
152.67	**18**	**9-Apr**	**Female**	**4**	**Positive**	**Negative**	**Negative**	**Negative**
NA	**12**	**10-Apr**	**Male**	**2**	**Negative**	**Negative**	**Negative**	**Negative**

FUTURE WORK

Mountain goats will be captured in winter 2014 as part of an on-going disease surveillance and population monitoring effort. A total of five female mountain goats 2+-years of age will be fitted with Telonics VHF and GPS radio-collars. Once all radio-collars are deployed additional captures will continue in an effort to collect biological samples in support of the disease surveillance effort.

Our work is in cooperation with Dr. Robert Garrott, Montana State University, and the Greater Yellowstone Mountain Ungulate Project (GYAMUP). The primary goal of the project is to gain a better understanding and knowledge of bighorn sheep and mountain goat ecology and the interactions between the two species.

This corroborative effort between various state and federal agencies, and private entities will result in one of the most comprehensive databases of knowledge and understanding of bighorn sheep and mountain goats in the GYA.

F18
4+ - YEARS OLD
FREQUENCY: 152.670
SNAKE RIVER CANYON
CAPTURED: 9 APRIL 2013

Literature Cited

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Hayden, J.A. 1990. ed. Mountain goat management plan. 1991-1995. Idaho Dept. Fish and Game. Boise. 25pp.

Photo Credits

Cover: Mountain goat in Snake River Canyon: Mark Gocke
Page 1: Ferry Peak, Snake River Range: Gary Fralick
Page 3: Mountain goat with handlers: Gary Fralick
Page 3: Mountain goats on winter range Snake River Canyon: Gary Fralick

2013 - JCR Evaluation Form

Species: Bison

Period: 6/1/2013 - 5/31/2014

Herd: BI101 - JACKSON

Hunt Areas: 2, 888

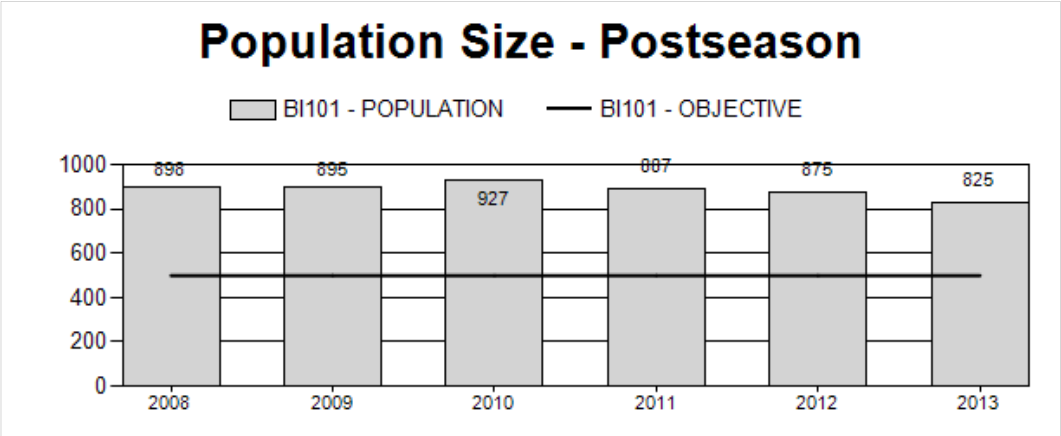
Prepared By: ALYSON COURTEMANCH

	2008 - 2012 Average	2013	2014 Proposed
Population:	896	825	775
Harvest:	194	234	230
Hunters:	256	328	320
Hunter Success:	76%	71%	72 %
Active Licenses:	256	328	320
Active License Percent:	76%	71%	72 %
Recreation Days:	1,811	2,363	2,200
Days Per Animal:	9.3	10.1	9.6
Males per 100 Females	68	52	
Juveniles per 100 Females	46	48	

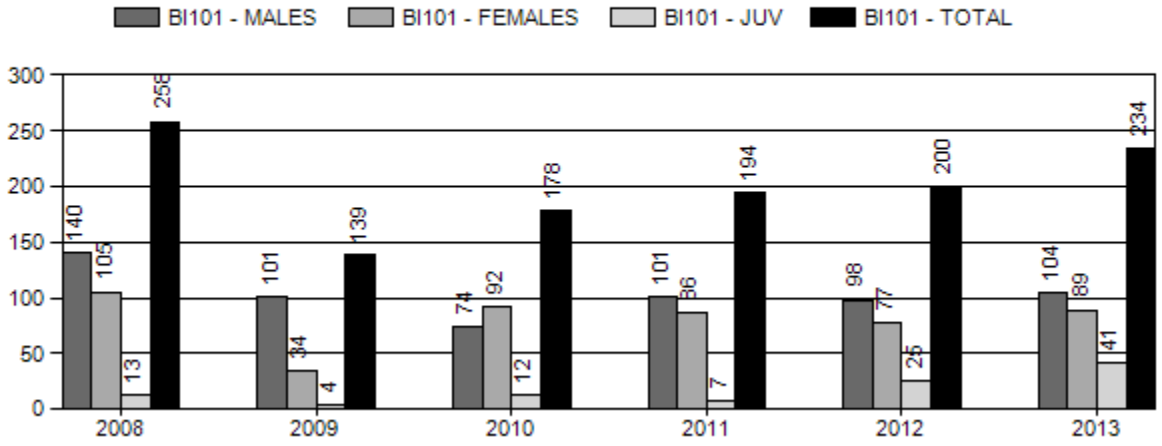
Population Objective:	500
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	65%
Number of years population has been + or - objective in recent trend:	0
Model Date:	None

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

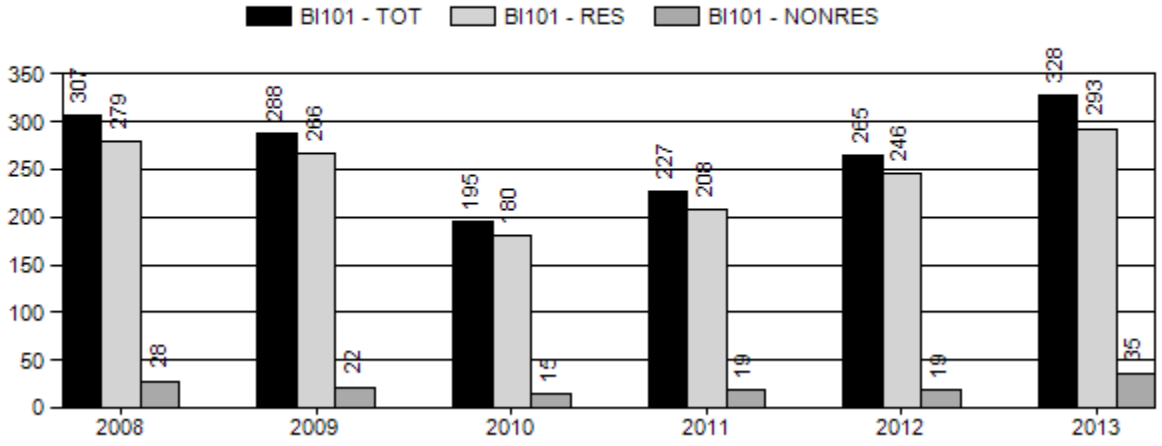
	JCR Year	Proposed
Females ≥ 1 year old:	na%	na%
Males ≥ 1 year old:	na%	na%
Juveniles (< 1 year old):	na%	na%
Total:	na%	na%
Proposed change in post-season population:	na%	na%



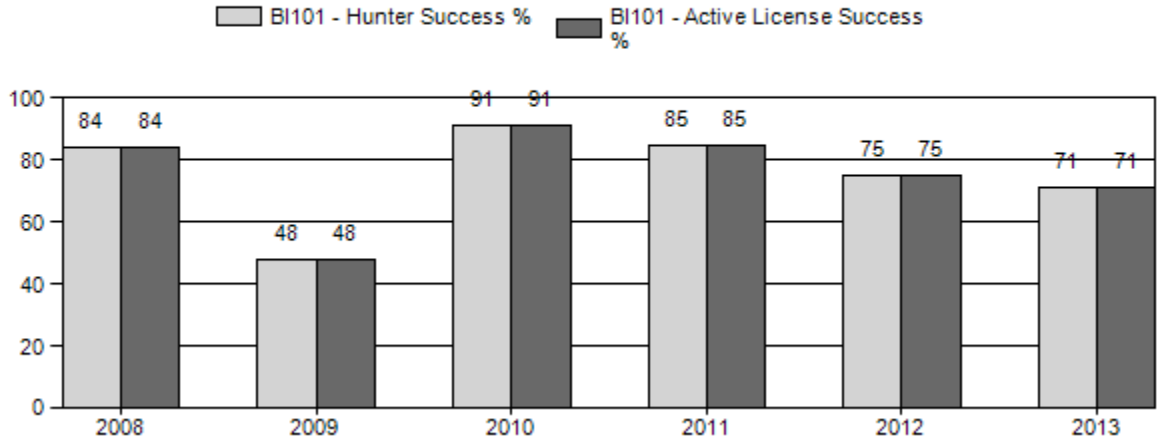
Harvest

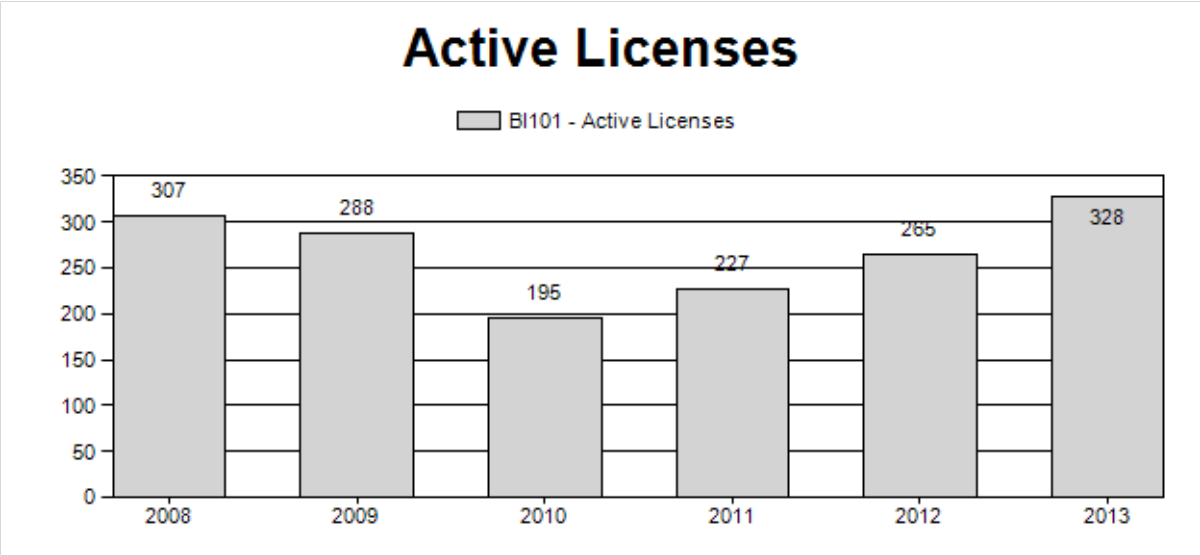


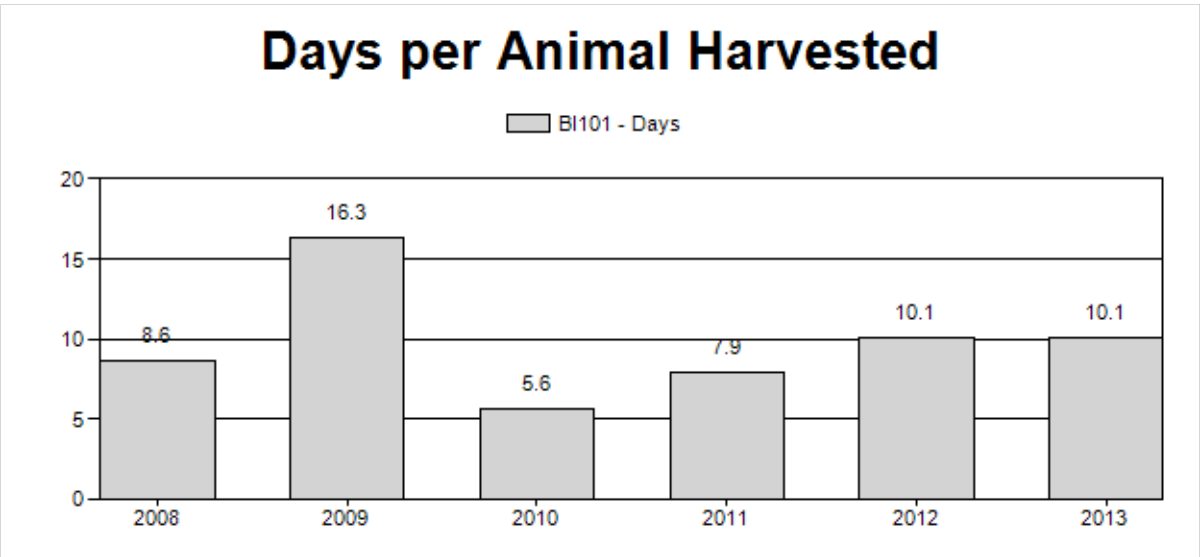
Number of Hunters

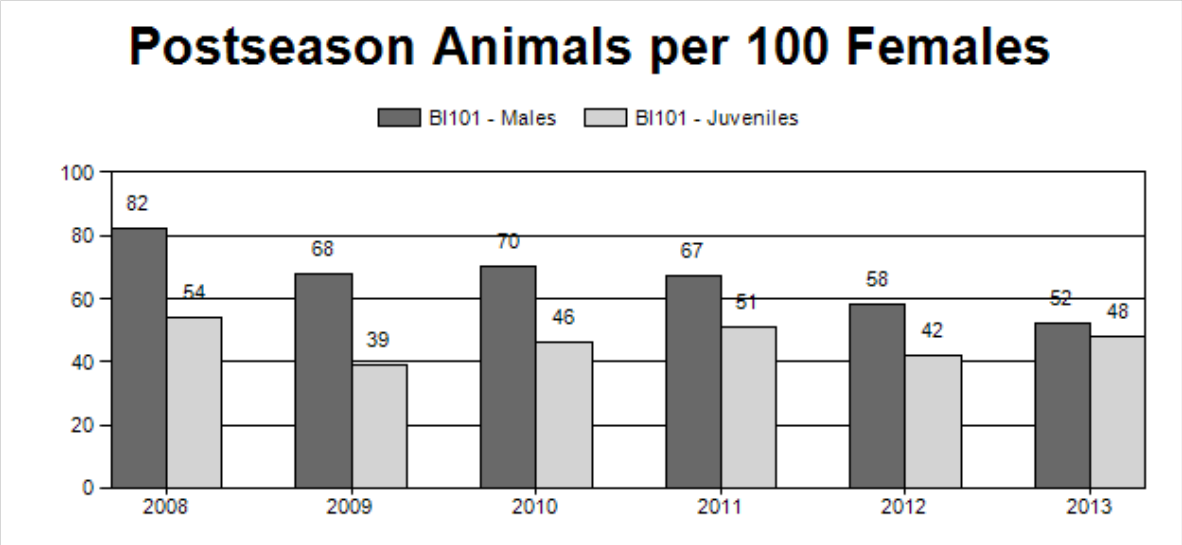


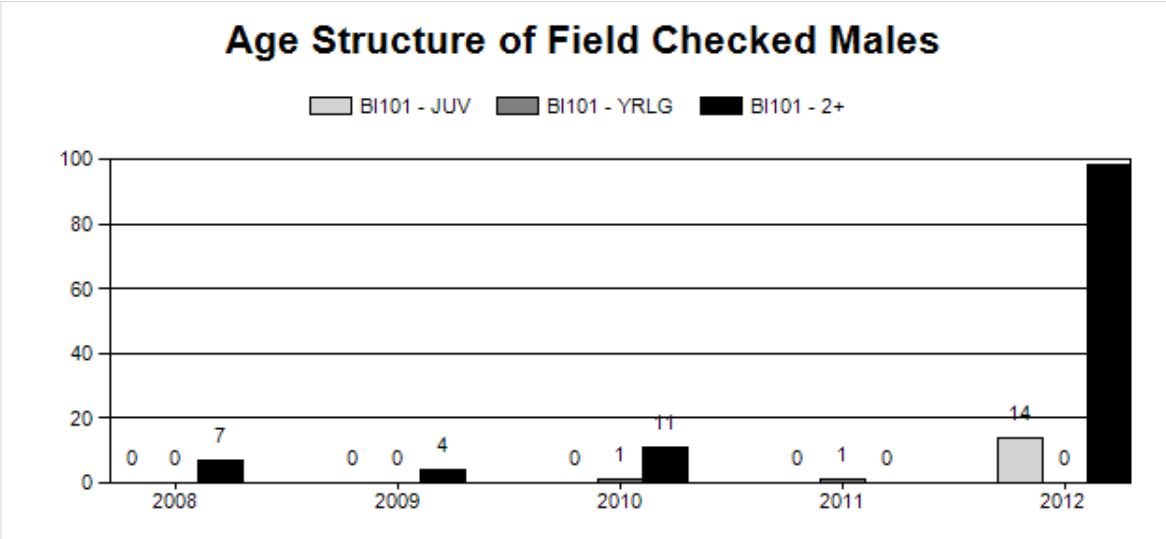
Harvest Success

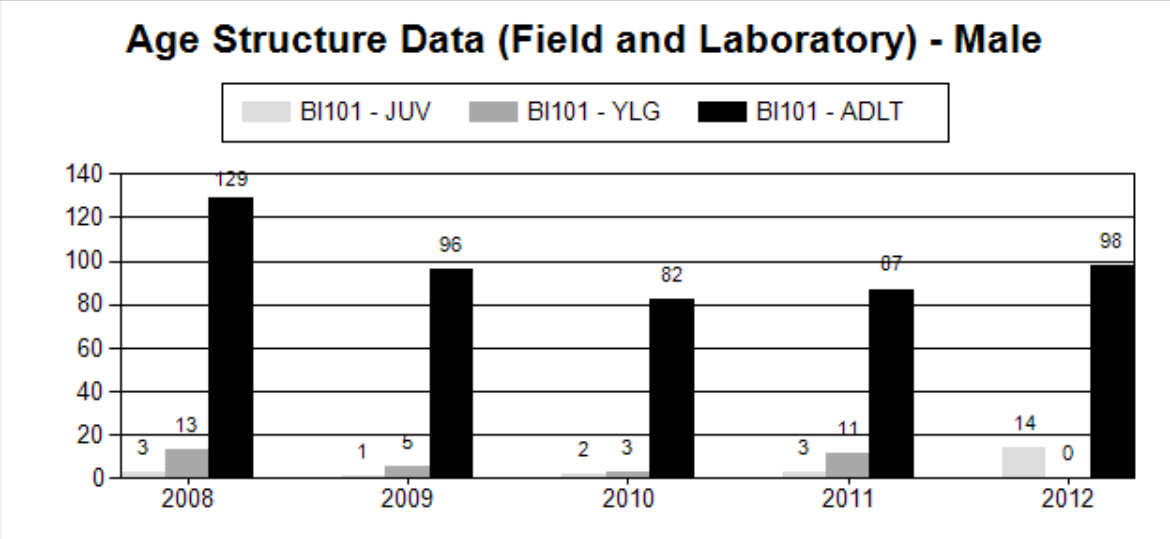


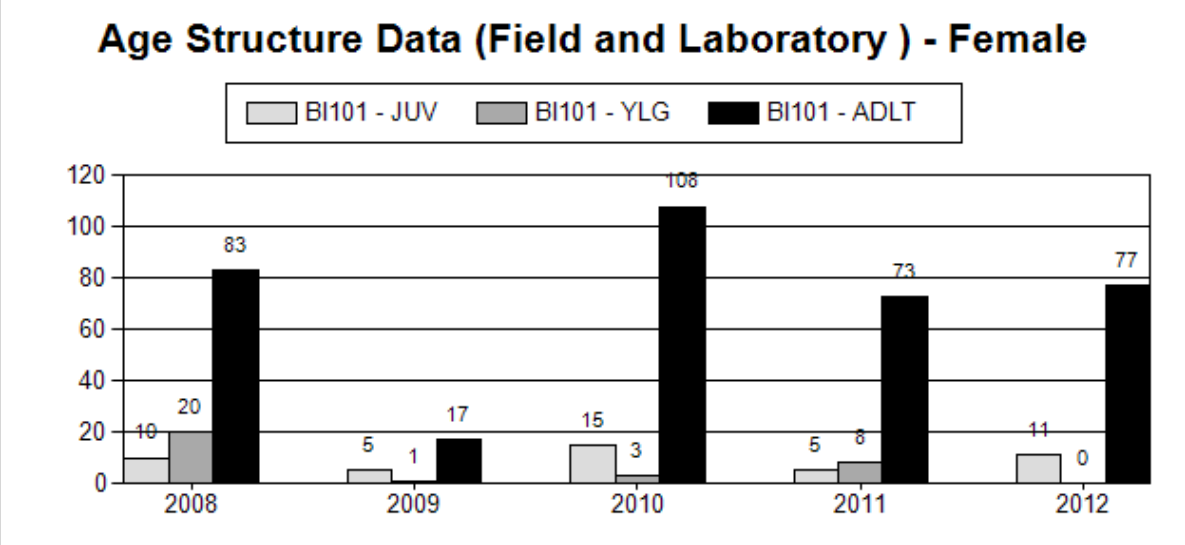

Active Licenses
BI101 - Active Licenses
350
300
250
200
150
100
50
0
307
288
195
227
265
328
2008
2009
2010
2011
2012
2013


Days per Animal Harvested
BI101 - Days
20
15
10
5
0
8.6
16.3
5.6
7.9
10.1
10.1
2008
2009
2010
2011
2012
2013


Postseason Animals per 100 Females
BI101 - Males
BI101 - Juveniles
100
80
60
40
20
0
82
54
68
39
70
46
67
51
58
42
52
48
2008
2009
2010
2011
2012
2013


Age Structure of Field Checked Males
BI101 - JUV
BI101 - YRLG
BI101 - 2+
100
80
60
40
20
0
0 0 7
0 0 4
0 1 11
0 1 0
14 0
2008
2009
2010
2011
2012


Age Structure Data (Field and Laboratory) - Male
BI101 - JUV
BI101 - YLG
BI101 - ADLT
140
120
100
80
60
40
20
0
3 13 129
1 5 96
2 3 82
3 11 87
14 0 98
2008
2009
2010
2011
2012


Age Structure Data (Field and Laboratory) - Female
BI101 - JUV
BI101 - YLG
BI101 - ADLT
120
100
80
60
40
20
0
10 20 83
5 1 17
15 3 108
5 8 73
11 0 77
2008
2009
2010
2011
2012

2008 - 2013 Postseason Classification Summary

for Bison Herd BI101 - JACKSON

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	898	98	203	301	35%	369	42%	200	23%	870	0	27	55	82	± 0	54	± 0	30
2009	895	81	206	287	33%	421	48%	165	19%	873	0	19	49	68	± 0	39	± 0	23
2010	927	76	218	294	32%	423	46%	193	21%	910	0	18	52	70	± 0	46	± 0	27
2011	887	102	156	258	31%	386	46%	196	23%	840	0	26	40	67	± 2	51	± 1	30
2012	875	73	174	247	29%	429	50%	179	21%	855	0	17	41	58	± 1	42	± 1	26
2013	825	74	131	205	26%	398	50%	191	24%	794	0	19	33	52	± 1	48	± 1	

2014 HUNTING SEASONS
JACKSON BISON HERD (BI101)

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
2	1	Aug. 15	Jan. 18	90	Limited quota	Any wild bison; also valid in Area 1 within the Clark's Fork River and Soda Butte Creek drainages. Valid in other portions of Area 1 upon notification by the department; other limitations specified during notification
	4	Aug. 15	Jan. 18	225	Limited quota	Any female or calf wild bison; also valid in Area 1 within the Clark's Fork River and Soda Butte Creek drainages. Valid in other portions of Area 1 upon notification by the department; other limitations specified during notification

Summary of 2014 License Changes

Hunt Area	Type	Quota change from 2013	Other changes from 2013
2	1	-20	+ 6 days
	4	-75	+ 6 days

Management Evaluation
Current Postseason Population Management Objective: 500
Management Strategy: Recreational
2013 Postseason Population Estimate: ~825
2014 Proposed Postseason Population Estimate: ~775

The population objective for the Jackson Bison herd is 500 bison. The management strategy is recreational and the objective and management strategy were last revised in 2008.
The current population estimate is approximately 825 bison. Annual harvest rates have recently begun to slowly reduce the population. The population objective will be reviewed in 2014.

Herd Unit Issues

Management of this herd is complicated because occupied habitat includes Grand Teton National Park (GTNP), the National Elk Refuge (NER) and the Bridger-Teton National Forest (BTNF). Bison remain distributed in GTNP during much of the summer and fall and are not available for hunting until they migrate to either BTNF or the NER. Over the past several years, bison have become sensitized to the presence of hunters on the NER and will vacate the open hunt area. Hunter numbers are limited on the NER in an attempt to provide hunters with a quality hunting experience while moving the population toward the post-hunt objective of 500 bison.

Weather

Following an extremely dry summer and fall in 2012, weather conditions in 2013 were considerably wetter. The area received significant pulses of spring and fall moisture, which improved forage conditions for bison and other ungulates. At the time of the mid-winter survey, winter precipitation was reported at 109% of normal. Please refer to the following web sites for specific weather station data. **http://www.ncdc.noaa.gov/temp-and-precip/time-series** and **http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html**

Habitat

No habitat data has been collected on bison summer and winter ranges. There are no established vegetation transects in this herd unit. Please refer to the 2013 Annual Report Strategic Habitat Plan Accomplishments for Jackson Region habitat improvement project summaries (**http://wgfd.wyo.gov/web2011/wildlife-1000708.aspx**).

Field Data

During the mid winter trend survey in 2014 a total of 786 bison were classified in the McBride and Poverty Flats areas on the NER and an additional 25 bison were observed on native ranges in the Spread Creek and Snake River areas for a total of 811 bison counted. Personnel from GTNP and the Wyoming Game & Fish Department classified 131 adult males, 74 yearling males, 398 cows and 191 calves. Seventeen bison were unclassified. Total herd unit ratios were 52 bulls:100 cows and 48 calves:100 cows. The bull ratio has steadily declined from 82:100 in 2008, likely due to bull harvest. The population is managed to maintain a high bull:cow ratio. Trend data indicate that the bison population has stabilized and begun to slowly decline with current harvest levels.

Harvest Data

Hunter numbers are managed to maintain hunter presence throughout the fall, however, in recent years, fewer Type 4 hunters contacted to participate in the hunt actually purchase licenses. During the 2013 season, a total of 110 hunters on the Any Wild Bison Priority list (Type 1 license) and 300 hunters on the Female/Calf Wild Bison Priority list (Type 4 license) were contacted by the Department. Initial hunter notifications are higher than the estimated harvest because not all persons notified purchased licenses to hunt. In 2013, 93% (n=102) of the hunters contacted on the any wild bison priority list purchased a license compared to 85% (n=93) in 2012 and 85% in 2011. Seventy-four percent (n=221) of the hunters contacted on the female/calf wild bison priority list purchased a license in 2013 compared to 49% in 2012, 45 % in 2011, and 62% in 2010. There were 5 Governor's tags sold for bison in 2013.

During the 2013 bison season 328 hunters harvested 104 bulls, 89 cows, and 41 calves. In 2012, 265 hunters harvested 98 bulls, 77 cows, and 25 calves. In 2011, hunters harvested 194 total bison and during 2010, hunters harvested 178 total bison. In 2012, hunters reported a 71% success rate. In 2013, 16 bulls were harvested using Type 4 cow/calf licenses. Most of these incidents were due to sex misidentification by the hunter.

The annual bison harvest must exceed 200 animals to move this population toward its mid-winter objective of 500 bison. Changes in 2013 to increase hunter harvest included improving access along the Gros Ventre River through GTNP and implementing periodic hunting season closures on the NER in an effort to allow bison to move south and repopulate the NER without the presence of hunters. Intermittent closures during the 2013 hunting season did not have the desired effect on encouraging bison to move south and will not be implemented in 2014. Other changes made to improve access will remain in place for the 2014 bison season, which will again open on August 15. Additional changes this year are a reduction in Type 1 licenses in response to the declining bull:cow ratio and a reduction in Type 4 licenses to better match realistic demand. Also, the season will be extended by 6 days, until January 18, to increase opportunity for late season harvest.

Population

The 2014 mid winter trend count indicates that the population decreased by approximately 50 animals in 2013. The population peaked at 1,100 animals 2007, was stabilized by harvest from 2008-2010 and has started to trend downward in recent years. Consistently high calf:cow ratios

have made it difficult to reduce the population. Harvest levels need to continue to exceed 200 bison in order to move this population toward the post-season objective of 500 animals.

Management Summary

Hunting season quotas for female/calf wild bison will be 225 in 2014, a reduction in 75 from 2013. This change is to better match the actual demand for licenses. In 2013, only 221 Type 4 licenses were sold from the 300 quota. The quota for any wild bison will be 90 in 2014, a reduction of 20 licenses from 2013. This is in response to the declining bull:cow ratio and the fact that additional bulls are accidently harvested on Type 4 licenses each year. Hunter access will be allowed along the Gros Ventre River from U.S. Highway 191 and along the Kelly Road in GTNP. Trend data and harvest levels indicate that a reduction of the population was achieved during years when harvest levels exceed 200 animals. Nearly all bison migrate to the NER and each year a high percentage of the population is counted and most cow/calf groups are fed on the NER. Since 2007, an average of 190 calves has been counted, indicating that harvest levels must exceed this count in order to move this population toward objective.

Appendix A.

JOINT RECOMMENDATION TO THE WYOMING GAME AND FISH DEPARTMENT AND THE SUPERINTENDENT OF GRAND TETON NATIONAL PARK CONCERNING ELK MANAGEMENT WITHIN GRAND TETON NATIONAL PARK FOR THE YEAR 2014

The undersigned field representatives of the Wyoming Game and Fish Department and Grand Teton National Park respectfully submit for your joint consideration the following supporting information and a recommended elk management program for Grand Teton National Park for 2014. The proposed programs have the long-range objectives of reducing the need to harvest elk within Grand Teton National Park, continue progress toward restoring historic distributions and migration patterns, and encourage elk to use historic fall and winter range areas in the southern half of Grand Teton National Park. The proposed program would continue to manage for a winter National Elk Refuge herd of 5,000 elk.

Supporting Information

The harvest quotas established below are maximum harvest objectives associated with Grand Teton National Park and the National Elk Refuge herd segments. These quotas are part of the overall harvest objectives established for the Jackson elk herd unit.

Management data indicate the portion of the Jackson Elk Herd wintering on lands within the National Elk Refuge number approximately 8,300 animals during the 2013 – 2014 winter. The estimated post hunt 2014 population will be approximately 11,500 elk. To reduce this herd segment towards the population objective, the harvest must exceed 1,000 elk. A harvest of the Grand Teton National Park, Area 78, and the National Elk Refuge herd segments is desired. The following harvest quotas focus on resident and migrating elk that winter on or adjacent to the National Elk Refuge. The proposed season structure should lead to restoration of traditional elk numbers and migration patterns in areas outside National Park boundaries and to reduce elk numbers toward the National Elk Refuge population objective of 5,000 elk.

Maximum Harvest Quotas

Areas 75, 79 (Grand Teton National Park, Summer Herd Segment)	300
Area 77 (National Elk Refuge, Grand Teton National Park, Area 78, and Area 80, Summer Herd Segment)	400
Areas 70, 71, 75, 77 & 79 (North Migratory Segment)	300
	1,000

Recommended 2014 Park Program

The following elk management program is recommended for Grand Teton National Park in 2014 to facilitate an overall coordinated interagency program for managing the Jackson Elk Herd. The management program will be open to persons holding a valid Grand Teton National Park Permit and certified as having successfully completed an approved Hunter Safety Course. Hunters are only allowed to harvest one elk during the 2014 Grand Teton National Park elk management program.

1. Issue 200 Area 75 Type 4 Limited Quota Licenses valid for antlerless elk for the period October 18 through November 30, 2014 in that portion of Area 75 designated as open. The area designated as the Snake River Bottom from Deadman's Bar access road to Ditch Creek west of US Highway 26, 89, 191 shall be closed.

2. Allow Area 75 Type 4 licenses to hunt in Area 75 for the period December 1 through December 7, 2014 in that portion of Area 75 designated as open. The area designated as Antelope Flats and the area designated as the Snake River Bottom from Deadman's Bar access road to Ditch Creek west of US Highway 26, 89, 191 shall be closed.

3. Issue 450 Area 75 Type 6 Limited Quota Licenses valid for cow or calf elk for the period October 18 through November 30, 2014 in that portion of Area 75 designated as open. The area designated as the Snake River Bottom from Deadman's Bar access road to Ditch Creek west of US Highway 26, 89, 191 shall be closed.

4. Allow Area 75 Type 6 licenses to hunt in Area 75 for the period December 1 through December 7, 2014 in that portion of Area 75 designated as open. The area designated as Antelope Flats and the area designated as the Snake River Bottom from Deadman's Bar access road to Ditch Creek west of US Highway 26, 89, 191 shall be closed.

5. Allow unused Area 75 Type 4 licenses to hunt in Area 79 for antlerless elk for the period of October 18 to November 2, 2014 in that portion of Area 79 designated as open.

6. Maintain hunting in Area 75 through December 7, 2014 and Area 79 through November 2, 2014 or prior to the maximum harvest quota being obtained from these hunt areas. Hunt Areas may close on two days notice if the overall quota is reached prior to the closing date.

7. Maintain the closure of Area 72 and monitor elk numbers and movement patterns in that herd segment.

8. Retain a provision for extending the season to obtain desired quotas.

9. Maintain posted boundaries in Area 75 and 79 for ½ mile around most buildings, as indicated on the detailed Area 75 and 79 hunt area maps. Buildings not included in this closure include those within the Gros Ventre Campground, all stand-alone toilets and/or wellhouses, the McCollister Cabin, the Shane Cabin, the Cunningham Cabin, the Cowboy Cabin, and the Elk Ranch buildings. In addition, a portion of Area 75 in the SW 1/4 of Section 22, T43N, R115W, S½ S½ of Sections 3 and 4, T42N, R115W, will be posted as closed.

10. The technical committee of the Jackson Hole Cooperative Elk Studies Group annually reviews all available data concerning the Jackson Elk Herd to better evaluate the reduction program within Grand Teton National Park.

11. When any news media contacts either the Wyoming Game and Fish Department or Grand Teton National Park concerning the elk reduction program, the agency contacted by the news media will immediately notify the other agency to establish a coordinated response.

Grand Teton National Park

Michael Nash, Chief Park Ranger — Date 5.9.2014
Grand Teton National Park

Steve Cain, Senior Wildlife Biologist — Date 5.9.2014
Senior Wildlife Biologist

Wyoming Game and Fish Department (WGFD)

Tim Fuchs, Regional Supervisor — Date 5/9/14
WGFD, Jackson Region

Alyson Courtemanch, Wildlife Biologist — Date 5/9/14
WGFD, Jackson Region

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2. Allow Area 75 Type 4 licenses to hunt in Area 75 for the period December 1 through December 7, 2014 in that portion of Area 75 designated as open. The area designated as Antelope Flats and the area designated as the Snake River Bottom from Deadman's Bar access road to Ditch Creek west of US Highway 26, 89, 191 shall be closed.

3. Issue 450 Area 75 Type 6 Limited Quota Licenses valid for cow or calf elk for the period October 18 through November 30, 2014 in that portion of Area 75 designated as open. The area designated as the Snake River Bottom from Deadman's Bar access road to Ditch Creek west of US Highway 26, 89, 191 shall be closed.

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5. Allow unused Area 75 Type 4 licenses to hunt in Area 79 for antlerless elk for the period of October 18 to November 2, 2014 in that portion of Area 79 designated as open.

6. Maintain hunting in Area 75 through December 7, 2014 and Area 79 through November 2, 2014 or prior to the maximum harvest quota being obtained from these hunt areas. Hunt Areas may close on two days notice if the overall quota is reached prior to the closing date.

7. Maintain the closure of Area 72 and monitor elk numbers and movement patterns in that herd segment.

8. Retain a provision for extending the season to obtain desired quotas.

9. Maintain posted boundaries in Area 75 and 79 for ½ mile around most buildings, as indicated on the detailed Area 75 and 79 hunt area maps. Buildings not included in this closure include those within the Gros Ventre Campground, all stand-alone toilets and/or wellhouses, the McCollister Cabin, the Shane Cabin, the Cunningham Cabin, the Cowboy Cabin, and the Elk Ranch buildings. In addition, a portion of Area 75 in the SW 1/4 of Section 22, T43N, R115W, S½ S½ of Sections 3 and 4, T42N, R115W, will be posted as closed.

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Grand Teton National Park

5.9.2014

Michael Nash, Chief Park Ranger — Date
Grand Teton National Park

5.9.2014

Steve Cain, Senior Wildlife Biologist — Date
Senior Wildlife Biologist

Wyoming Game and Fish Department (WGFD)

5/9/14

Tim Fuchs, Regional Supervisor — Date
WGFD, Jackson Region

5/9/14

Alyson Courtemanch, Wildlife Biologist — Date
WGFD, Jackson Region

BRUCELLOSIS MANAGEMENT (EL102) – 2013 JCR

FEEDGROUND SURVEILLANCE

Gros Ventre Feedgrounds

Ten adult female elk were chemically immobilized and fitted with GPS collars in late March, 2014. An eleventh elk was captured at the National Elk Refuge (NER) on March 26, 2014 to remove a collar deployed on Alkali Creek feedground in the spring of 2013. GPS collars are scheduled to drop during February, 2015. Four of the 11 (36.4%) blood samples tested positive for exposure to *B. abortus* (Table 1). However, this sample size falls far short of WGFD's standard for 85% confidence that the measured seroprevalence is within +/- 15% of the actual seroprevalence, thus no inferences should be made about the population from these data.

VIT and GPS collar data have been collected in the Gros Ventre since 2010 as part of an effort to analyze relationships between serostatus and elk movements, define brucellosis transmission risk areas, determine parturition locations and investigate elk use of habitat treatments. Collar and VIT locations of 10 elk telemetered during 2013-2014 are shown in Figure 1. Collar data from Gros Ventre elk will be compared to elk on other feedgrounds for determining effects of feedground practices and feeding season length. The Safari Club International funded a portion of the collar costs in 2010-2013, and North Wind provided the 10 collars deployed in 2014 (mortality collars from a separate project in southwestern Sublette Co., WY with a year of battery life remaining).

Table 1. Yearling, adult, and total female seroprevalence of elk on feedgrounds in the Jackson elk herd based on 4 standard tests and cELISA, 1985-2014.

		Yearling			**Adult**			**All Females**		
Feedground	**Year**	**+**	***n***	**%**	**+**	**n**	**%**	**+**	***n***	**%**
Alkali	1990	3	8	38	27	108	25	30	116	26
	1992	1	6	17	25	65	38	26	71	37
	1999	0	1	0	12	47	26	12	48	25
	2002*	0	0	0	4	6	67	4	6	67
	2010*	0	0	0	1	6	17	1	6	17
	2012*	0	0	0	2	10	20	2	10	20
	2013*	0	1	0	2	9	20	2	10	20
	Sum	**4**	**16**	**7.9**	**73**	**251**	**30.4**	**77**	**267**	**30.3**
Patrol Cabin	2002*	0	0	0	5	13	38	5	13	38
	2003*	0	0	0	3	6	50	3	6	50
	2011*	0	0	0	0	4	0	0	4	0
	2012*	0	0	0	1	1	100	1	1	100
	2013*	0	0	0	1	1	100	1	1	100

	2014*	0	0	0	3	10	30	3	10	30
	Sum	**0**	**0**	**0**	**13**	**35**	**53**	**13**	**35**	**53**
NER	1985*	1	3	33	2	10	20	3	13	23
	1988	0	6	0	22	44	50	22	50	44
	1990	0	6	0	10	30	33	10	36	28
	1993	0	0	0	12	38	32	12	38	32
	1995*	2	7	29	5	10	50	7	17	41
	1996	5	10	50	16	49	33	21	59	36
	1997*	0	5	0	6	25	24	6	30	20
	1998	3	18	17	28	60	47	31	78	40
	1999	0	6	0	9	33	27	9	39	23
	2001*	0	1	0	1	13	8	1	14	7
	2002	3	18	17	10	37	27	13	55	24
	2003*	1	7	14	3	16	19	4	23	17
	2004*	1	1	100	0	4	0	1	5	20
	2005*	1	2	50	4	8	50	5	10	50
	2006*	0	2	0	5	24	21	5	26	19
	2007*	0	0	0	2	17	12	2	17	12
	2009*	0	0	0	0	12	0	0	12	0
	2010*	1	2	50	1	8	13	2	9	22
	2011*	0	0	0	5	12	42	5	12	42
	2012*	0	0	0	2	12	17	2	12	17
	2014*	0	0	0	1	1	100	1	1	100
	Sum	**18**	**94**	**17.1**	**144**	**463**	**29.8**	**161**	**555**	**29.4**

* Inadequate sample size for the estimated prevalence to be +/- 15% of the true prevalence.

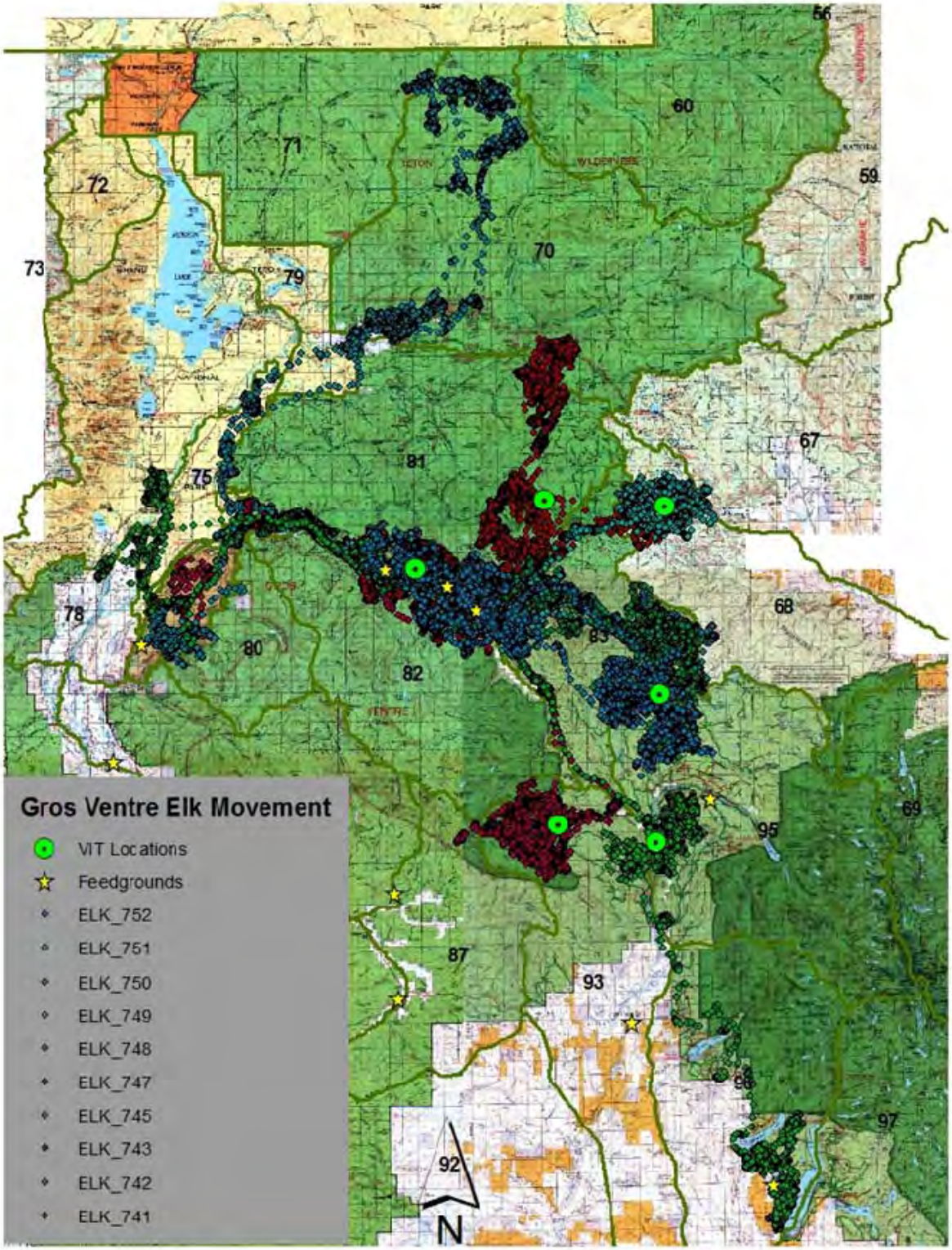

Figure 1. VIT locations (bright green circles) and GPS collar locations from elk captured on Alkali Creek and Patrol Cabin feedgrounds, February 2013 through January 2014.

A total of 1,263 individual elk were captured and tagged on the National Elk Refue (1,135), Alkali (128) and Patrol Cabin (17) feedgrounds between 1993 and 2013. Among these, information of 180 harvested elk were returned to the WGFD. A breakdown of eartag return locations by elk herd unit is in Table 2. Over 87% of all elk tagged in the Jackson herd were harvested in the Jackson herd.

Table 2. Proportion of elk eartag returns of elk captured and tagged on Patrol Cabin, Alkali, and the National Elk Refuge feedgrounds in the Jackson elk herd from 1993-2013.

Jackson elk eartag return summary; 1993-2013			
Location of harvest	Number of returns	Percent of total tag returns	Percent of all tagged elk
Jackson herd	157	87.2%	12.4%
Unreported area	10	5.6%	0.8%
Upper GR herd	5	2.8%	0.4%
Fall Cr. herd	3	1.7%	0.2%
Hoback herd	2	1.1%	0.2%
State of Idaho	1	0.6%	0.1%
Targhee herd	1	0.6%	0.1%
Wiggins Fk. Herd	1	0.6%	0.1%
Total	180	100%	1263

STRAIN 19 VACCINATION

Gros Ventre Feedgrounds

Vaccination efforts were conducted at Patrol Cabin feedground from March 10-14, 2014. Alkali Creek and Fish Creek feedgrounds had few or no elk in attendance during vaccination. Feeders and WGFD personnel vaccinated 328 of the 373calves classified (88%). A total of 7,818 elk have been vaccinated on the Gros Ventre feedgrounds since vaccination efforts were established in the area. Annual vaccine coverage on the Gros Ventre feedgrounds has been declining over the last decade because of unpredictable elk distributions and behavior.

National Elk Refuge

Brucella Strain 19 elk vaccination has occurred annually on the NER basis since the winter of 2003. In 2014, vaccination activities began February 11 by acclimating elk to the presence of the snowcat and the sound of the vaccine and paint-marking guns. The first live vaccine was fired February 14 but with less than ideal vaccination conditions, progress was slow and vaccination attempts ceased on March 24. Vaccinating elk on the NER tends to be the least efficient/most labor-intensive site compared to the state-

operated feedgrounds; a team of 3 contract employees vaccinated from a single snowcat during the 2013/2014 winter further reducing the efficacy of the program. A total of 237 calves were vaccinated out of 1097 classified on the NER during winter 2014 (22% coverage). Since 2003, 8,448 elk have been vaccinated with s19 on the NER (7,836 calves, 612 cows).

CHRONIC WASTING DISEASE SURVEILLANCE

The National Elk Refuge (NER) provided funds to the Wyoming Game and Fish Department (WGFD) to support Chronic Wasting Disease (CWD) surveillance in the Jackson elk herd and adjacent elk, deer, and moose herds during the 2013 hunting seasons. The funding was used to hire two temporary CWD technicians, employed with the WGFD from mid-September through December 2013. The technicians logged 1024 hours and 10,694 miles, mostly while conducting field contacts with hunters and pulling samples (medial retropharyngeal lymph nodes) from carcasses. Having two technicians allowed field presence nearly every day of open hunting seasons in the Jackson area, and helped maximize the number of samples collected from all species throughout the Jackson WGFD Region.

The highest yielding method of collecting elk samples for subsequent CWD testing in the Jackson region comes from hunter contacts in the field, especially those within Grand Teton National Park (GTNP) and the NER. Hunter contacts are made throughout the fall in an effort to increase sample size and participation, and to educate hunters on CWD. NER parking areas and highly used locations in GTNP, such as the Kelly Hayfields and Blacktail Butte, are reliable places to make hunter contacts and collect samples. Frequent communication among NER law enforcement, elk retrieval operators and other WGFD personnel is essential for locating successful hunters soon after they've harvested their elk. During calendar year 2013, 300 lymph nodes were collected from elk sampled within the Jackson elk herd (Table 3).

Successful hunters whose animals are not sampled in the field are requested to deposit heads with attached harvest information in bear-proof containers placed at Moose and Moran Junctions within GTNP in the same locations as the tooth and permit drops. Another container is stationed at Kelly Warm Springs, mostly for use by hunters returning from the Gros Ventre drainage, and more head-drop containers are placed at three of the hunter parking areas on the NER. Additional collection barrels in the Jackson region are located at the WGFD office in Jackson, South Park Wildlife Habitat Management Area (WHMA), Camp Creek, Greys River road, and the Greys River WHMA.

Many samples are obtained though the cooperation of the local game meat processor (Jackson Hole Ice & Game and Hog Island Meats). Processor employees save heads along with harvest date, location, and hunter contact information, which are retrieved by CWD technicians daily. CWD samples are also collected from road-killed and "targeted" (euthanized due to illness) animals throughout the year. In addition, GTNP personnel make a concerted effort to sample from road-killed animals within the Park (Figure 2).

Personnel at the WGFD Wildlife Disease Laboratory use the IDEXX enzyme-linked immunosorbent assay (ELISA) to analyze lymph node samples for CWD. Any IDEXX-positive samples would then be confirmed with the Bio-Rad ELISA. Samples positive on both ELISAs would be confirmed by immunohistochemistry. Results are reported to hunters typically within three weeks of sample submission. Hunters can obtain results by accessing the Department's web site, and hunters that submit a positive sample are personally notified via phone and letter. The WGFD also notifies other state wildlife agencies if a hunter from their state harvests a CWD test-positive animal in Wyoming.

Table 3. CWD samples collected from elk within the Jackson elk herd by year, with corresponding population and harvest estimates.

Year	Sample size	Population Estimate	% of Est. Pop Sampled	# Harvested	% of Harvest Sampled
1997	243	16463	1.48%	3290	7.39%
1998	317	17641	1.80%	3159	10.03%
2000	197	16385	1.20%	2350	8.38%
2002	234	13457	1.74%	2253	10.39%
2004	187	12610	1.48%	1818	10.29%
2005	189	12855	1.47%	1776	10.64%
2006	184	12904	1.43%	1678	10.97%
2007	116	12795	0.91%	1689	6.87%
2008	301	12935	2.33%	1316	22.87%
2009	434	13349	3.25%	1486	29.21%
2010	414	11976	3.46%	1414	29.28%
2011	275	11962	2.30%	1146	24.00%
2012	241	11051	2.18%	1037	23.24%
2013	300	11500	2.61%	1100	27.27%

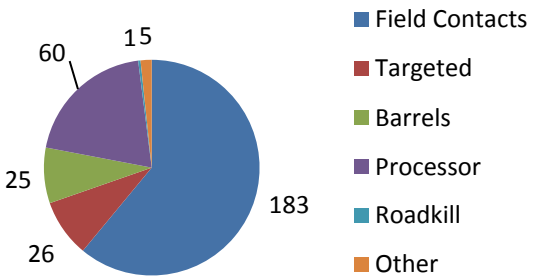

Figure 2. Collection method of 300 total elk CWD samples obtained in the Jackson elk herd, 2013.

BRUCELLOSIS MANAGEMENT (EL103) – 2013 JCR

FEEDGROUND SURVEILLANCE/RESEARCH

Camp Creek Feedground

Five adult female elk were chemically immobilized at this site on March 18, 2014. Three of the five captured elk were pregnant, and were fitted with Vaginal Implant Transmitters (VITs) that will be expelled upon either abortion or parturition during late winter/spring 2014, and GPS collars which record a location every 30 minutes that will automatically drop off in one year. One of these elk died in May 2014 of probable mountain lion predation. All five cows were bled for brucellosis diagnostics, and two (40%) were considered positive for exposure to *B. abortus* (Table 1). However, this sample size falls far short of WGFD's standard for 85% confidence that the measured seroprevalence is within +/- 15% of the actual seroprevalence, thus no inference of brucellosis prevalence should be made about the population from these data.

Dog Creek Feedground

Five adult female elk were chemically immobilized on this feedground on March 13, 2014; all cows were pregnant and received GPS collars and VITs. The GPS collars are on 30 minute fixes and programmed to drop in January of 2016. Four of the five (80.0%) blood samples were considered positive for exposure to *B. abortus* (Table 1). However, this sample size is also short of WGFD's standard for 85% confidence that the measured seroprevalence is within +/- 15% of the actual seroprevalence, thus no inference of brucellosis prevalence should be made about the population from these data.

South Park Feedground

One adult female elk was chemically immobilized and fitted with a GPS collar and VIT on March 1, 2014. This female had been captured and equipped with a GPS collar and VIT at Camp Creek feedground during the winter of 2012-13 but the collar failed to drop off as programmed during January of 2014 when the elk was found on South Park feedground. Upon capture to remove the collar at South Park, it was determined the cow was again pregnant and was opportunistically fitted with a new VIT and GPS collar, which is programmed to drop in January of 2015. Blood collected during the capture was considered negative for exposure to *B. abortus* (Table 1).

Table 1. Yearling, adult, and total female seroprevalence of elk on feedgrounds in the Fall Creek Elk Herd based on 4 standard tests and cELISA, 1987-2014.

		Yearling			Adult			All Females		
Feedground	**Year**	**+**	***n***	**%**	**+**	**n**	**%**	**+**	***n***	**%**
South Park	2003	4	12	33	8	30	27	12	42	29
	2005*	0	1	0	0	1	0	0	2	0
	2008	2	10	20	11	21	52	13	31	42
	2009*	0	0	0	3	7	43	3	7	43
	2010*	0	0	0	4	7	57	4	7	57
	2011	2	18	11	14	27	52	16	45	36
	2013	0	0	0	0	0	0	16	64	25
	2014*	0	0	0	0	1	0	0	1	0
	Sum	**8**	**41**	**20**	**40**	**94**	**28.9**	**64**	**199**	**29**
Horse Creek	1988*	1	4	25	8	24	33	9	28	32
	2000	2	12	17	18	30	60	20	42	48
	2011*	0	0	0	3	4	75	3	4	75
	2012*	0	0	0	2	5	40	2	5	40
	Sum	**3**	**16**	**19**	**31**	**63**	**49**	**34**	**79**	**43**
Camp Creek	1989	2	12	17	24	52	46	26	64	41
	2013*	0	0	0	2	5	40	2	5	40
	2014*	0	0	0	2	5	40	2	5	40
	Sum	**0**	**0**	**0**	**28**	**62**	**42**	**30**	**74**	**40.3**
Dog Creek	1987*	0	0	0	0	1	0	0	1	0
	1996*	0	5	0	4	13	31	4	18	22
	1997*	0	0	0	6	6	100	6	6	100
	1998*	1	6	17	1	4	25	2	10	20
	2010*	0	0	0	3	4	75	3	4	75
	2014*	0	0	0	4	5	80	4	5	80
	Sum	**1**	**11**	**9**	**18**	**33**	**51.8**	**19**	**44**	**49.5**

* Inadequate sample size for the estimated prevalence to be +/- 15% of the true prevalence.

Table 2. Proportion of elk eartag returns of elk captured and tagged in the Fall Creek elk herd compared to other elk herds in Western Wyoming from 1993-2013.

Fall Creek elk eartag return summary; 1993-2013			
Location of harvest	Number of returns	Percent of total tag returns	Percent of all tagged elk
Fall Cr. herd	93	75.6%	10.7%
Afton herd	12	9.8%	1.4%
Jackson herd	9	7.3%	1.0%
Unreported area	4	3.3%	0.5%
Hoback herd	3	2.4%	0.3%
Cody herd	1	0.8%	0.1%
Piney herd	1	0.8%	0.1%
Total	123	100%	869

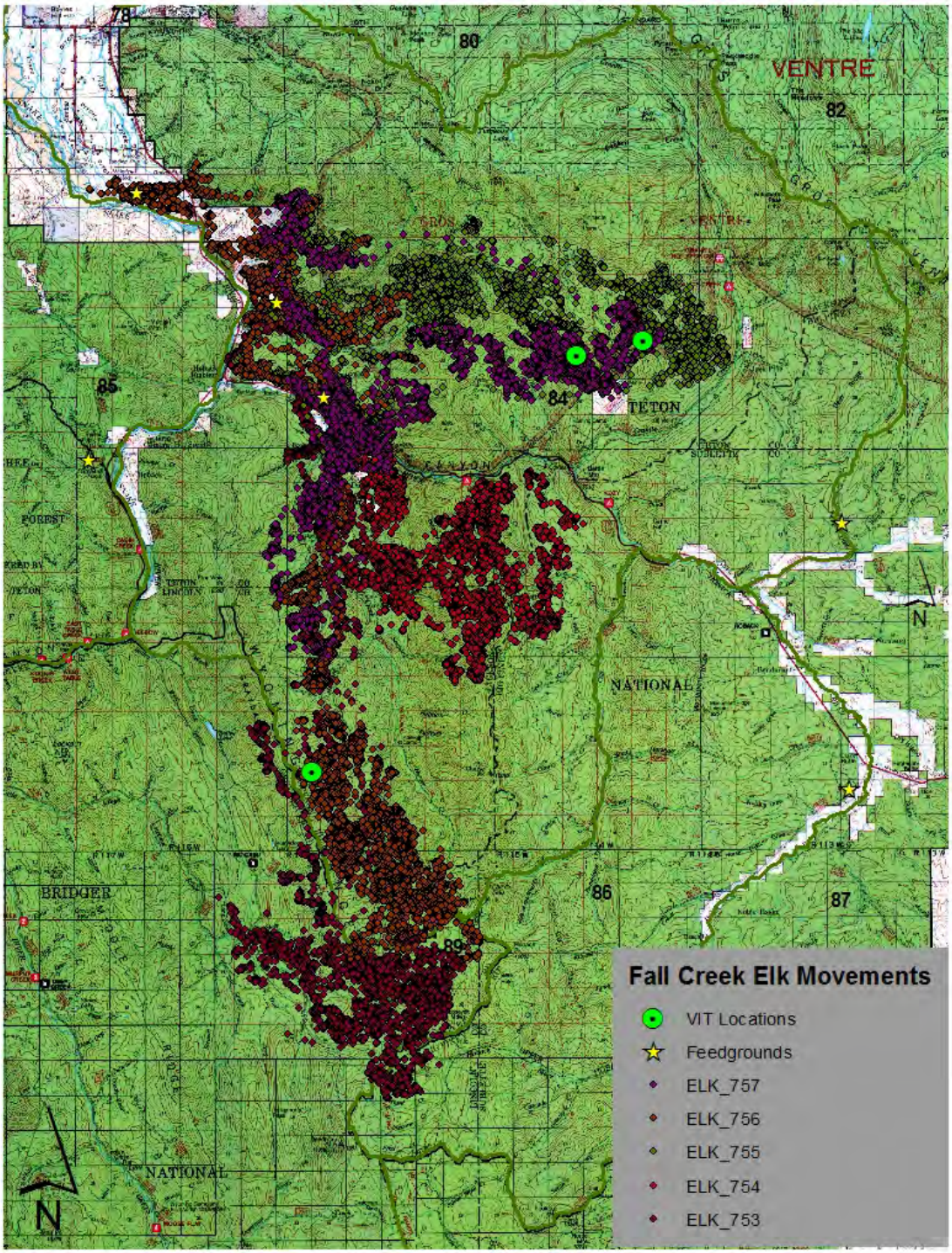

Figure 1. VIT expulsion locations (bright green circles; parturition sites) and GPS collar locations from elk captured on Camp Creek feedground, February 2013 through January 2014.

STRAIN 19 VACCINATION

Dog Creek Feedground
Vaccination was completed from March 11th-18th, 2014. While 191 calves were classified, 170 calves (89%) were vaccinated, potentially due to elk movements from the feedground post classification. From 1990, when the vaccination program was initiated on the Dog Creek feedground, 4,681 juveniles and 1,252 adults have been vaccinated.

Camp Creek Feedground
Vaccination was completed from January 30th through March 11th, 2014. The majority of elk in the Horse Creek/Camp Creek feedground complex attended Camp Creek during vaccination activities facilitating increased coverage with 85% of Camp Creek calves receiving vaccine and 73% of all calves classified in the Horse Creek/Camp Creek feedground complex being vaccinated. Since 1993, a total of 3,855 juveniles have been vaccinated. Elk were first vaccinated on Camp Creek in 1989.

Horse Creek Feedground
Vaccination was not attempted at Horse Creek feedground in 2014. Most of the cow and calf elk within the Horse Creek/Camp Creek feedground complex attended Camp Creek during vaccination. Calf elk remaining at Horse Creek feedgound proved to be very sensitive to human activity and often left the area resulting in increased private property damage concerns. Since 1993, a total of 4,910 juveniles have been inoculated. Elk were first vaccinated on Horse Creek feedground in 1989.

South Park Feedground
Vaccination was completed for the 23rd consecutive year at this feedground. The elk feeder vaccinated elk from March 1st -8th. While 210 calves were classified in February, 260 calves (>100%) were vaccinated, potentially due to elk movements to the feedground after classification and some yearlings may have been misidentified as calves and received a booster dose. Since 1990 when vaccination began at South Park, a total of 5,639 juveniles and 909 adult females have been inoculated.

BRUCELLOSIS MANAGEMENT (EL105) - 2013

BRUCELLOSIS SURVEILLANCE/RESEARCH

Greys River Feedground

Elk were not captured at Greys River feedground this winter due to warm temperatures in early February which caused the elk trap to be inundated with nearly 3 feet of water. Colder temperatures later in the month froze and prevented operation of nearly all trap chutes and gates. This was the first winter in nearly a quarter century that elk have not be captured at this feedground and tested for antibodies to *Brucella abortus*. Brucellosis serology data of elk captured from Greys River feedground in located in table 1.

From 2008-2013, 19 GPS collars and 38 VITs have been deployed on/in elk captured from the Greys River feedground. GPS collars were deployed on 19 individual elk for one year; data indicate some elk movement north into the Fall Creek elk herd and some movement west into Idaho, but most elk use occurs in HA 88 and the northwestern corner of HA 89 (Figure 1). Among the 38 VITs, WGFD personnel identified the locations of 32 parturition sites and 4 reproductive failures (abortions; Figure 1). One elk died prior to expelling the VIT, and one elk's VIT was classified as unknown (could not be located). These data are allowing managers to assess feedground interchange and define areas of high risk for inter and intra-specific brucellosis transmission.

Forest Park Feedground

Two adult females were chemically immobilized on this feedground on April 15, 2014. Brucellosis serology data of elk captured from Forest Park feedground in located in table 1. Both cows were pregnant and received novel, paired GPS collar-VIT technology for field testing in cooperation with the University of Wyoming and Advanced Telemetry Systems. The Irridium platform GPS collars communicate with the VIT while implanted, and upon expulsion the collar sends a signal to a satellite and the user is emailed the coordinates of the cow (and expelled VIT), essentially eliminating the need for periodic monitoring of VITs from the ground and air for abortion or parturition events. Deep snow conditions and winter-like weather this spring allowed easy darting at Forest Park in mid-April, one of the latest elk captures conducted.

From 2011-2013, 16 GPS collars and 15 VITs were deployed on elk captured from Forest Park. Collar data indicate most elk use is within HA90, with limited movement north into southern HA89 and east into HA 92 (Figure 1). Among the VITs, personnel documented 12 parturition sites and two abortions; one elk was confirmed pregnant via blood testing, but had not calved by early August when funding for flights prevented further monitoring. The signal from this VIT was not heard again.

Southern Star Valley native winter range (Spring Creek) elk collaring

The WGFD and University of Wyoming conducted an elk research project from 2010-2013 involving the collaring of elk on and off feedgrounds and body condition monitoring to determine potential differences in migrations and health, and document movements of little studied elk populations. Elk utilizing native winter range in the Spring and Crow creek areas of southern Star Valley, Wyoming were chosen as one of the four non-feedground elk populations for the project. Ten adult cows were net-gunned from a helicopter (Leading Edge Aviation, LLC) on January 8, 2010. All were negative for exposure to brucellosis, and received GPS collars programmed to drop off in 2012; 9 of the 10 were pregnant and received VITs. Nine of the 10 collars were retrieved, and data indicate significant movement west into Idaho following wintering in Wyoming, and one cow made a large movement south to winter on the southern end of the Sublette range north of Cokeville, Wyoming in 2011 (Figure 1). All nine VITs were retrieved and all parturition sites were located in Idaho.

Table 1. Yearling, adult, and total female seroprevalence of elk captured from feedgrounds in the Afton elk herd based on 4 standard tests and cELISA, 1985-2014.

AFTON ELK HERD UNIT										
Feedground	**Year**	**Yearling**			**Adult**			**All Females**		
		+	*n*	%	+	*n*	%	+	*n*	%
Forest Park	1985*	0	0	0%	5	7	71%	5	7	71%
	1986*	1	10	10%	4	10	40%	5	20	25%
	2001	1	9	11%	11	18	61%	12	27	44%
	2002	2	21	10%	14	28	50%	16	49	33%
	2011	2	16	13%	4	15	27%	6	31	19%
	2012	3	9	33%	14	31	45%	17	40	43%
	2013	0	11	0%	7	20	35%	7	31	23%
	2014	0	0	0%	1	2	50%	1	2	50%
	SUM	9	76	12%	60	131	46%	69	207	33%
Grey's River	1993	4	13	31%	10	34	29%	14	47	30%
	1994*	0	6	0%	5	18	28%	5	24	21%
	1995	1	19	5%	7	28	25%	8	47	17%
	1996	0	16	0%	4	17	24%	4	33	12%
	1997	3	14	21%	7	24	29%	10	38	26%
	1998	5	12	42%	9	31	29%	14	43	33%
	1999	2	6	33%	4	29	14%	6	35	17%
	2000	7	17	41%	10	21	48%	17	38	45%
	2001	5	12	42%	18	25	72%	23	37	62%
	2002	4	10	40%	19	32	59%	23	42	55%
	2003	6	17	35%	25	38	66%	31	55	56%
	2004	2	8	25%	20	31	65%	22	39	56%
	2005	1	16	6%	19	53	36%	20	69	29%
	2006*	0	2	0%	7	22	32%	7	24	29%
	2007	1	19	5%	4	17	24%	5	36	14%
	2008	1	6	17%	7	32	22%	8	38	21%
	2009	2	17	12%	8	25	32%	10	42	24%
	2010	2	9	22%	14	39	36%	16	48	33%
	2011	1	16	6%	9	35	26%	10	51	20%
	2012	1	23	4%	4	19	21%	5	42	12%
	2013	2	5	40%	6	37	16%	8	42	19%
	SUM	50	263	19%	216	607	36%	266	870	31%
	TOTAL	**59**	**339**	**17%**	**276**	**738**	**37%**	**335**	**1077**	**31%**

* inadequate *n* for the estimated prevalence to be +/- 15% of the true prevalence

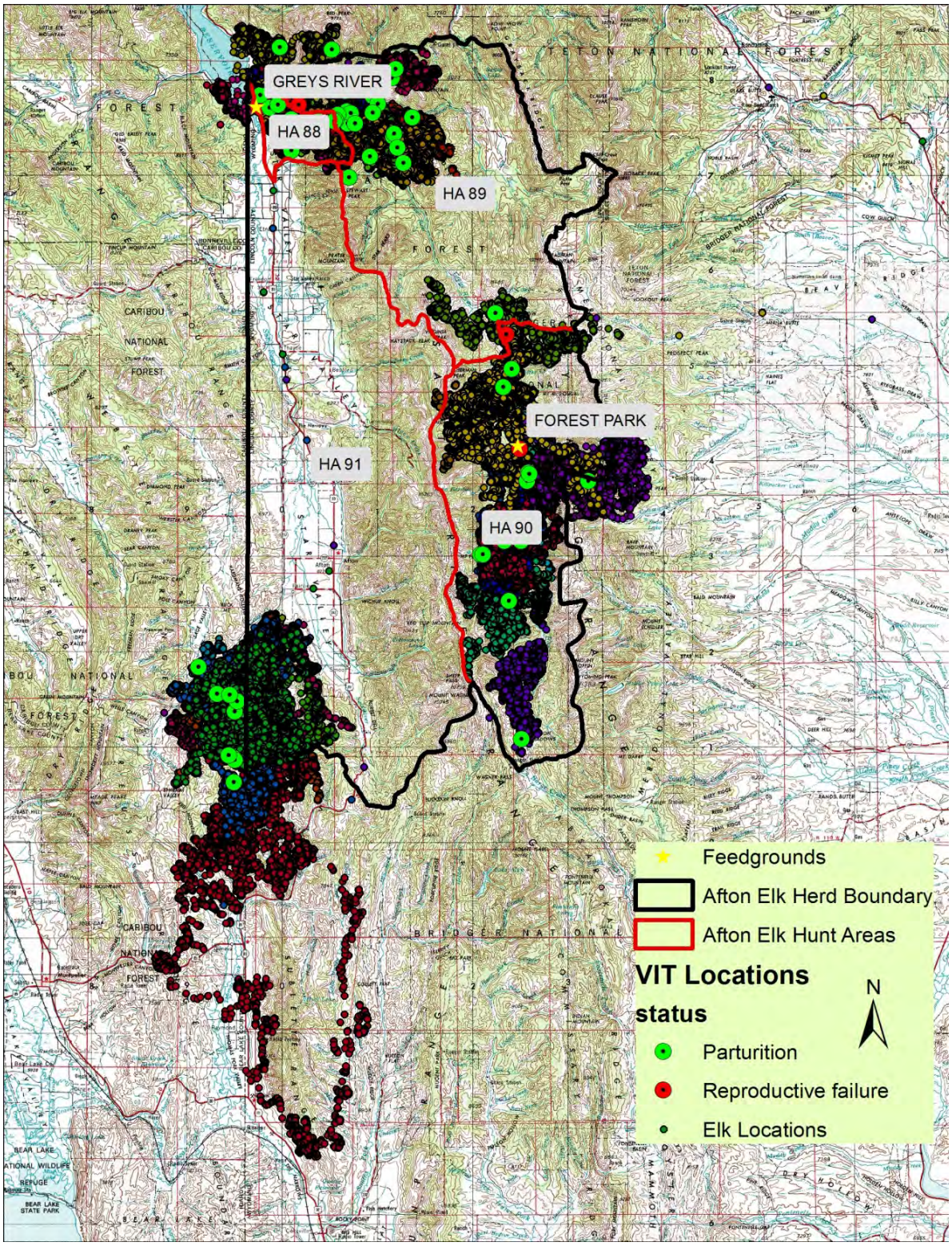

Figure 1. Elk feedgrounds, herd unit and hunt area boundaries, and elk GPS collar locations and VIT expulsion sites (2008-2013) of the Afton elk herd.

A total of 3,558 individual elk were captured and tagged on Greys River (2,824) and Forest Park (734) feedgrounds between 1993 and 2013. Among these, information of 410 harvested elk were returned to the WGFD. A breakdown of eartag return locations by elk herd unit is in Table 2. Over 90% of all elk tagged in the Afton herd were harvested in the Afton herd.

Table 2. Proportion of elk eartag returns of elk captured and tagged on Greys River and Forest Park feedgrounds in the Afton elk herd from 1993-2013.

Afton elk eartag return summary; 1993-2013			
Location of harvest	Number of returns	Percent of total tag returns	Percent of all tagged elk
Afton herd	371	90.5%	10.4%
Fall Cr. herd	19	4.6%	0.5%
State of Idaho	5	1.2%	0.1%
Piney herd	5	1.2%	0.1%
Unreported area	5	1.2%	0.1%
Hoback herd	3	0.7%	0.1%
Pinedale herd	1	0.2%	<0.1%
W. Green R. herd	1	0.2%	<0.1%
Total	410	100%	3558

STRAIN 19 VACCINATION

Greys River Feedground

Brucella abortus Strain 19 (S19) vaccination of elk calves on Greys River feedground was accomplished March 3, 2014. There were 115 calves at the time of classification; 107 calves were vaccinated for 93% coverage. The S19 elk vaccination program on Wyoming's feedgrounds initiated at the Greys River feedground in 1985. Since then, a total of 6,524 calves have been vaccinated on Greys River and yearly coverage has been very complete. Juvenile coverage rates has averaged nearly 100% since inception of the program. The large proportion of juveniles annually covered by s19 vaccine indicates a successful vaccination delivery program.

Forest Park Feedground

Vaccination at Forest Park was accomplished from March 6-18, 2014. There were 176 calves at the time of classification and 241 calves were vaccinated, indicating immigration of elk into the feedground after classification occurred. Vaccination was skipped at Forest Park in 2009 and again in 2011 because of short supplies of vaccine. In all other years, coverage has been nearly 100%. Vaccination was initiated at this feedground in 1988. Since that time, a total of 5,303 juveniles and 715 adult females have been vaccinated.

BRUCELLOSIS MANAGEMENT (B101) – 2013

HUNTER-HARVEST BRUCELLOSIS SURVEILLANCE 2013

The majority of successful bison hunters submitted blood samples from their harvested bison for brucellosis testing during fall of 2013 and early winter of 2014. Usable blood samples were collected from 78 bull bison and 66 cow bison. Serologic testing conducted at the WGFD's wildlife disease laboratory in Laramie indicated 67% of all bison tested in 2013/2014 were positive for antibodies to *Brucella abortus* (seropositive). A positive blood test reveals that the animal was exposed to the bacteria, but does not indicate actual infection. Brucellosis seroprevalence of male bison was 67% (*n* = 52/78), and 68% of females were positive (*n* = 45/66; Table 1). In addition to blood samples, hunters provided teeth for cementum annuli age determination. Cementum annuli analysis resulted in an average age of harvest for female bison (including male calf harvest) of 4.1 years (n=134) and male bison (males calves excluded) of 5.2 years (n=106).

Table 1. Seroprevalence of hunter-harvested bison from the Jackson Herd, 1999-2014. Sample sizes do not equal total harvested as not all harvested animals were sampled and not all samples were testable.

	Total Female Bison				**Total Male Bison**			
Year	**# Pos**	**# Neg**	**Total**	**%**	**# Pos**	**# Neg**	**Total**	**%**
1999	1	2	3	33	3	4	7	43
2000	4	1	5	80	2	3	5	40
2001	8	12	20	40	15	9	24	63
2002	10	11	21	48	15	6	21	71
2003	5	4	9	56	15	8	23	65
2004	7	2	9	78	12	5	17	71
2005	7	5	12	58	16	7	23	70
2006	19	4	23	83	13	9	22	59
2007	73	53	126	58	73	47	120	61
2008	63	33	96	66	68	58	126	54
2009	17	16	33	52	55	35	90	61
2010	62	35	97	64	52	27	79	66
2011	55	31	86	64	54	44	98	55
2014	45	21	66	68	52	26	78	67
Total	**376**	**230**	**606**	**60.6**	**445**	**288**	**733**	**60.4**