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2013 - JCR Evaluation Form

SPECIES: Mule Deer

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

HERD: MD104 - SUBLETTE

HUNT AREAS: 130, 138-142, 146, 150-156, 162

PREPARED BY: DEAN CLAUSE

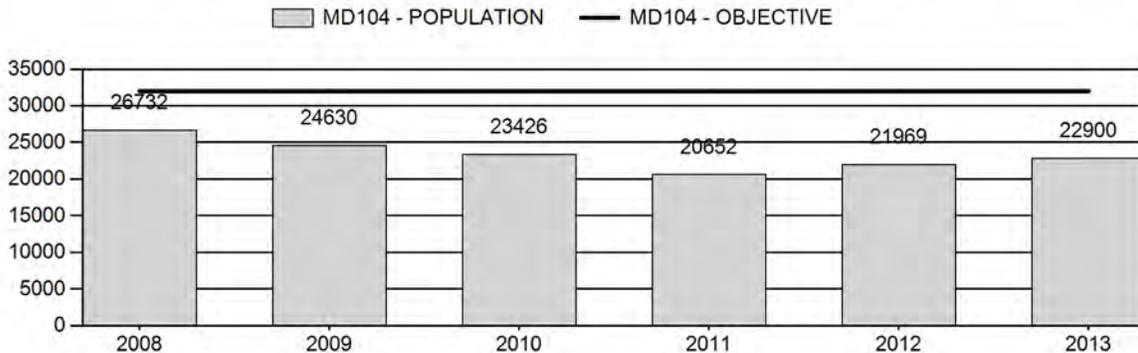
	<u>2008 - 2012 Average</u>	<u>2013</u>	<u>2014 Proposed</u>
Population:	23,482	22,900	23,080
Harvest:	1,655	1,576	1,500
Hunters:	4,496	4,130	4,100
Hunter Success:	37%	38%	37 %
Active Licenses:	4,501	4,143	4,100
Active License Percent:	37%	38%	37 %
Recreation Days:	26,500	23,341	23,300
Days Per Animal:	16.0	14.8	15.5
Males per 100 Females	37	36	
Juveniles per 100 Females	66	68	

Population Objective:	32,000
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-28.4%
Number of years population has been + or - objective in recent trend:	5
Model Date:	2/20/2014

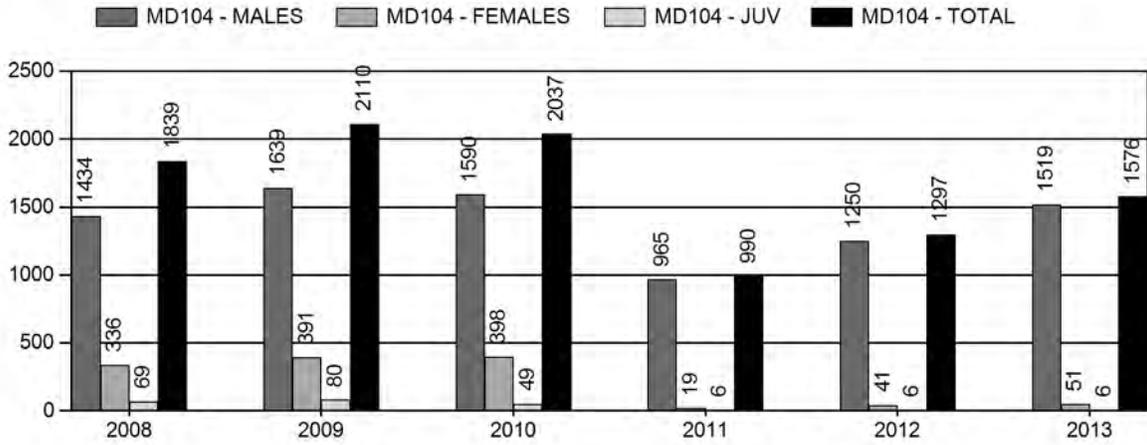
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	0.5%	0.5%
Males ≥ 1 year old:	29%	29%
Juveniles (< 1 year old):	<1%	<1%
Total:	6.4%	6.0%
Proposed change in post-season population:	3%	1%

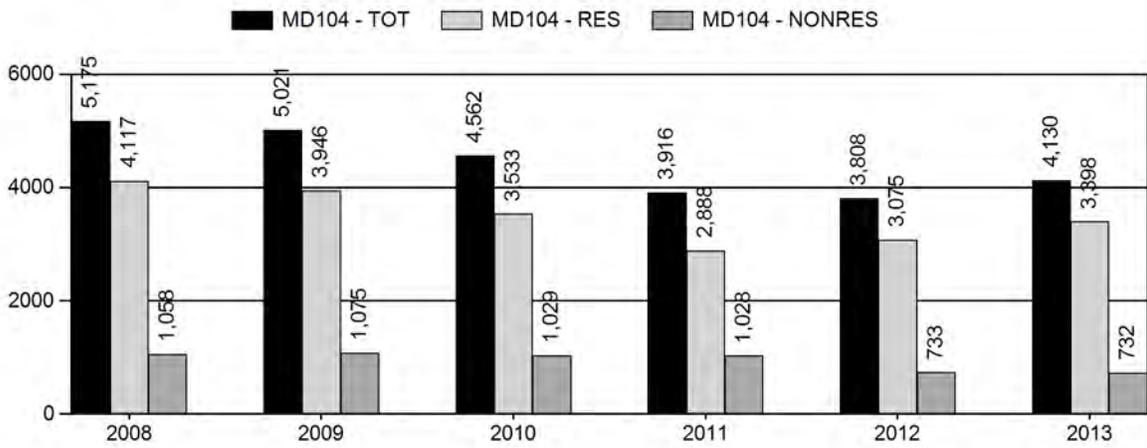
Population Size - Postseason



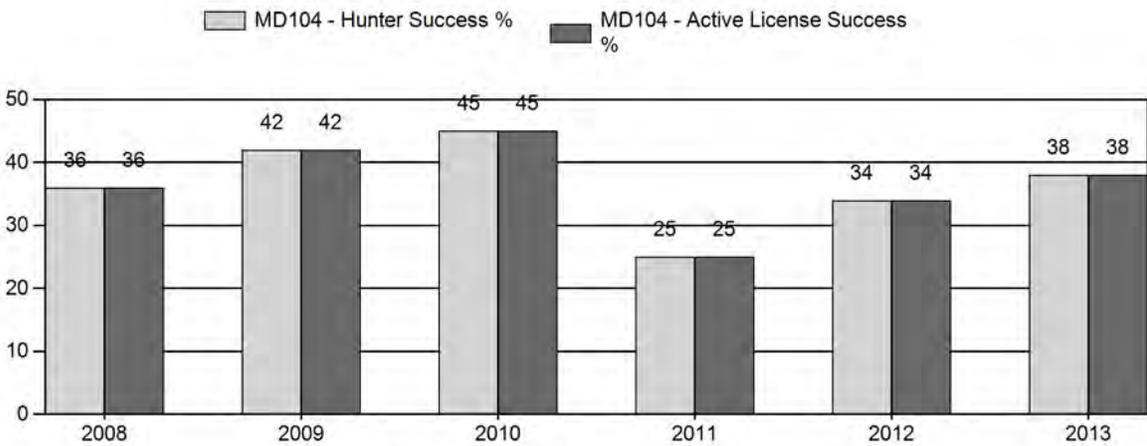
Harvest



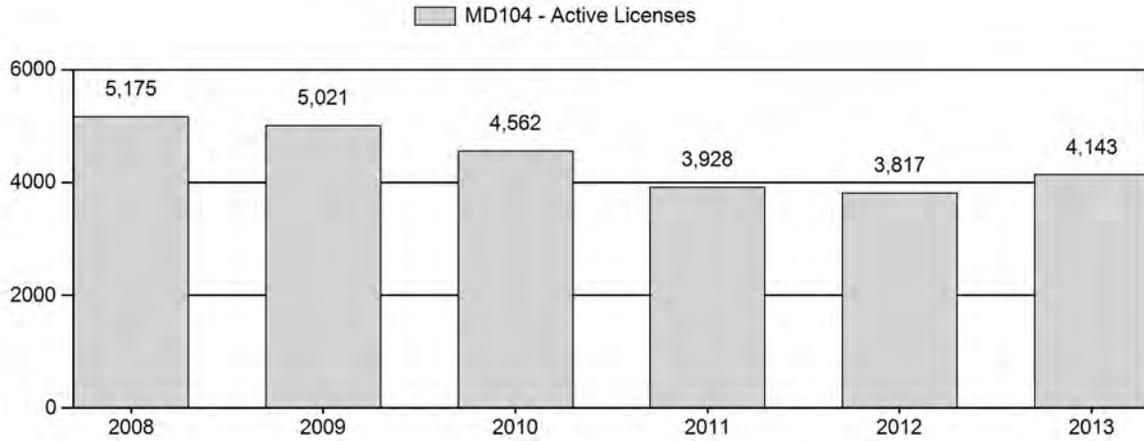
Number of Hunters



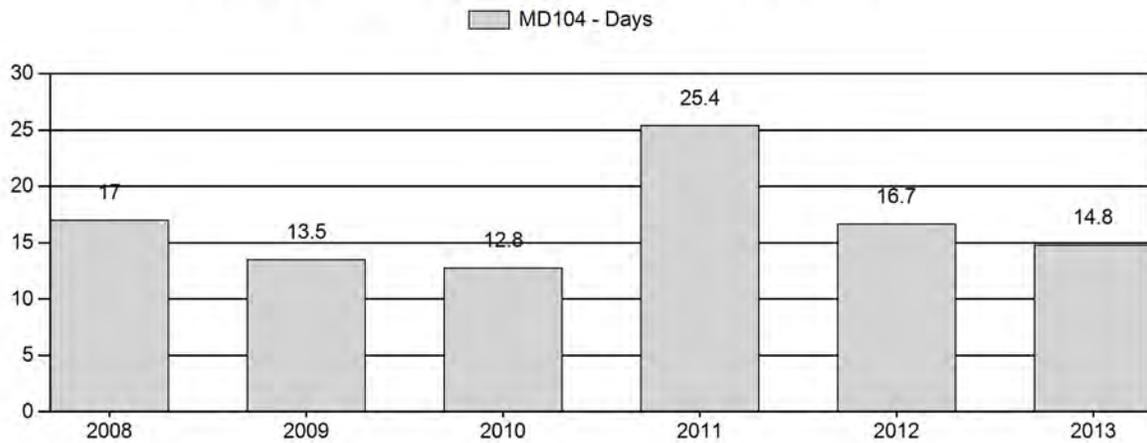
Harvest Success



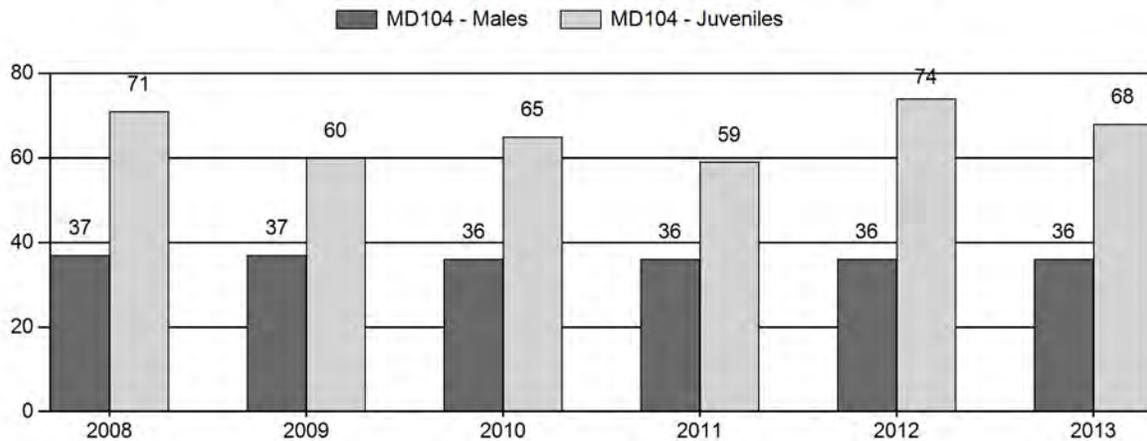
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Mule Deer Herd MD104 - SUBLETTE

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot CIs	Cls Obj	Males to 100 Females			Young to			
		Ylg	Adult	Total	%	Total	%	Total	%			Yng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	26,732	621	945	1,566	18%	4,205	48%	2,967	34%	8,738	1,570	15	22	37	± 1	71	± 2	51
2009	24,630	576	1,143	1,719	19%	4,596	51%	2,758	30%	9,073	1,186	13	25	37	± 1	60	± 1	44
2010	23,426	549	1,156	1,705	18%	4,677	50%	3,043	32%	9,425	1,345	12	25	36	± 1	65	± 2	48
2011	20,652	173	894	1,067	18%	2,985	51%	1,747	30%	5,799	1,141	6	30	36	± 1	59	± 2	43
2012	21,969	357	890	1,247	17%	3,498	48%	2,598	35%	7,343	1,626	10	25	36	± 1	74	± 2	55
2013	22,900	575	895	1,470	18%	4,044	49%	2,745	33%	8,259	1,436	14	22	36	± 1	68	± 2	50

2014 Seasons - Sublette Mule Deer (MD104)

Hunt Area	Type	Opens	Closes	Quota	License	Limitations
130		Oct. 1	Oct. 7		General	Antlered deer
	1	Oct. 15	Oct. 31	25	Limited quota	Antlered deer or any white-tailed deer
	6	Oct. 15	Dec. 31	75	Limited quota	Doe or fawn valid on private lands within Sweetwater County
138, 139, 140, 142	3	Oct. 1	Nov. 30	50	Limited quota	Any white-tailed deer
141, 162	1	Oct. 1 Oct. 22	Oct. 21 Oct. 31	100	Limited quota	Antlered deer Unused Areas 141, 162 Type 1 licenses valid for antlered deer on national forest
138, 139, 140, 142, 146, 151, 152, 153, 154, 155, 156		Sept. 15	Oct. 7		General	Antlered mule deer or any white-tailed deer
150		Sept. 15	Oct. 7		General	Antlered mule deer or any white-tailed deer valid west of Wyoming Highway 390
		Oct. 1	Oct. 7		General	Antlered mule deer or any white-tailed deer valid east of Wyoming Highway 390, archery only
Archery Seasons						
130, 141, 162		Sept. 1	Sept. 30			Refer to Section 3
138-140, 142, 153, 154, 146, 150-156		Sept. 1	Sept. 14			Refer to Section 3

REGION H NON-RESIDENT QUOTA - 800 LICENSES

Summary of Changes in License Numbers

Hunt Area	License Type	Quota Changes from 2013
MD104 Totals		No Changes

Management Evaluation

Current Postseason Population Management Objective: 32,000

Management Strategy: Special

2013 Postseason Population Estimate: ~23,000

2014 Proposed Postseason Population Estimate: ~23,000

The Sublette Mule Deer Herd Unit contains 2,682 square miles of habitat throughout Teton, Sublette, Lincoln and Sweetwater Counties. This deer herd contains 15 hunt areas (130, 138-142, 146, 150-156, 162) and is managed under special status which mandates postseason buck:100 doe ratios range between 30 to 45:100. The postseason population objective is 32,000 deer, adopted in 1991.

Herd Unit Issues

Winter survival, habitat condition and quality on winter ranges, and habitat loss (direct and indirect) from gas and residential development are the primary issues the influencing population dynamics in this herd unit. During the past 10 years, this deer herd experienced two winters that resulted in above normal fawn mortality (> 50% loss). Most recently, the 2010-11 winter fawn mortality estimates exceed 70%. Winter fawn mortality averages around 30% on most years when winter severity is moderate to average. Current annual growth on key winter browse species has been poor in recent years. Overall habitat conditions remain poor, but conditions have improved on certain years. Gas field development has and will continue to impact deer numbers within this herd unit. The Pinedale Anticline gas field development overlaps with crucial winter range located on the Mesa, where annual population estimates indicate deer numbers have decline by roughly 50% from 2001 – 2012. Studies have demonstrated that deer avoid areas with intensive winter gas development, resulting in less forage available for wintering deer within and adjacent to gas development.

Weather

With the overall large size of this herd unit, weather conditions can be somewhat different by geographic area (i.e. Wyoming Range Mountains vs. Wind River Mountains vs. Gros Ventre Mountains). In general, the overall amount of precipitation was below normal during 2009 and 2010, although spring moisture was good during those years resulting in improved forage production on winter range habitat. In 2011 winter and spring moisture was well above normal resulting in very good forage production. During 2012 and 2013, drought conditions persisted through most of the year resulting in very poor production, as several sagebrush monitoring locations had little to no current annual growth. Of particular importance to this deer herd is shrub production on native winter ranges at lower elevations in the Upper Green River Basin.

Late winter and spring precipitation (April to early June) is essential for good annual shrub production. Snow conditions were below normal this past winter (2013-14) until February when heavy snow accumulations occurred. Deep snow persisted well into late April.

Habitat

The Pinedale Region has several shrub monitoring sites where production and utilization data is collected. Figure 1 shows average shrub production by species by year. The primary shrubs available on winter ranges within this herd unit are mountain and Wyoming sagebrush and bitterbrush. Shrub utilization has varied by year as winter snow conditions (depth and crusting) appear to influence winter shrub use by location. The 2012-13 winter was mild, but resulted in higher than normal utilization attributed to very poor leader production during 2012. The 2013-14 winter started mild with snow loads increasing in February on northern most winter ranges. Production was again poor during 2013 having the potential to reduce survival this winter.

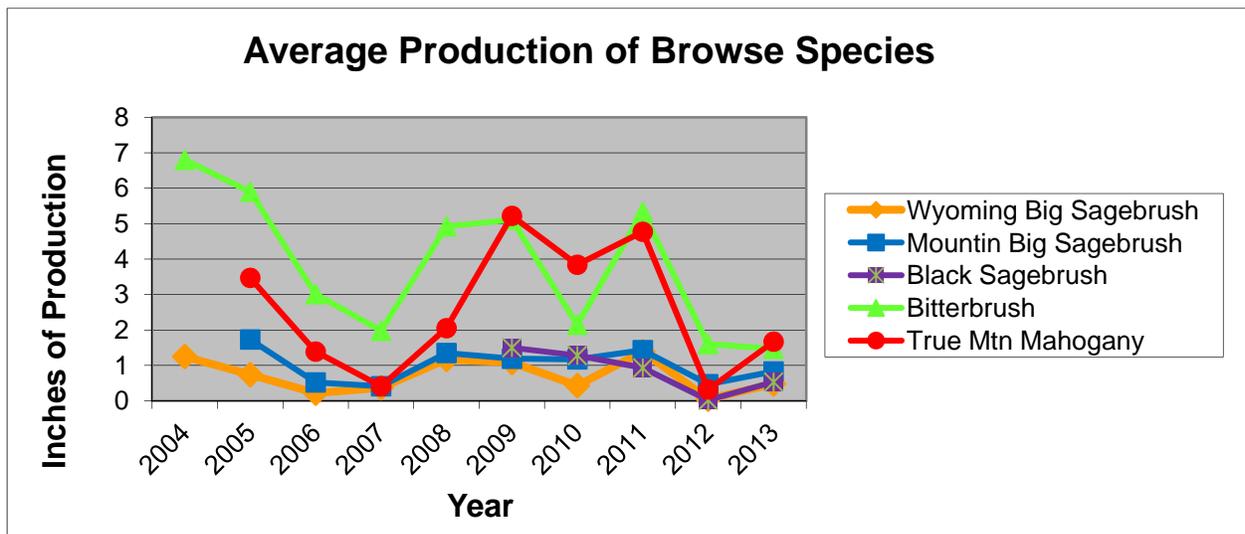


Figure 1. Shrub Production in the Upper Green River Basin, 2004-2013.

Please see the [2013 Annual Report Strategic Habitat Plan Accomplishments, Jackson and Pinedale Region sections](#) located at either the Jackson or Pinedale Game & Fish Regional Office for detailed summaries of habitat work within the Sublette Herd Unit. This Report also summarizes current research efforts to document deer body condition upon arrival and departure to and from winter habitats.

Field Data

Postseason herd composition (classification) counts in early December 2013 totaled 8,259 deer, incrementally increasing compared to the previous two years counts of 7,343 in 2012 and 5,799 in 2011. Some snow cover existed throughout all areas surveyed during the 2013, which led to normal deer distribution on crucial winter habitats. Survey effort to conduct herd composition counts has remained similar during all years, with the exceptions of a four hour reduction in flight time in 2008.

The postseason 2013 total buck:100 doe ratio of 36:100 has changed very little since 2007 and is meeting management goals for this herd unit. Yearling buck:100 doe ratios in 2013 improved to 14:100 indicating better fawn survival the previous year. A low yearling buck ratio of 6:100 in 2011 is attributed to fawn loss (estimated around 70%) during the winter of 2010-11. Adult buck ratios vary annually based on yearling buck recruitment and buck harvest levels. The 2013 adult buck: 100 doe ratio was 22, a slight drop compared that observed in 2012.

The 2013 fawn: 100 doe ratio of 68:100 dropped from that observed in 2012, but is slightly higher than the past 5-year average of 66:100. Good fawn production is important for population growth and sustainability, although winter fawn survival, which has been sporadic in this herd, appears to influence population trend the most.

Post winter change-in-ratio surveys were conducted in April of 2014 as deer began to leave winter range complexes. A total of 3,667 deer were classified during this spring survey, resulting in an 18% decline in the number of fawns/ 100 adults compared to the ratio observed during postseason classification counts in December 2013. Although this assessment of fawn mortality is an absolute minimum, the results indicate overall fawn survival was good during the 2013-14 winter. In addition, few dead deer have been documented on winter ranges this past winter and spring, providing further support that deer in this herd experienced good winter survival.

Harvest Data

The 2013 harvest was approximately 1,550 total deer (1,500 bucks and 50 does/fawns), an increase from the 2012 harvest of 1,300 deer. The 2011 harvest represents the lowest reported harvest in the past 15+ years at approximately 1,000 deer. The hunting seasons in 2011-2013 were more conservative compared to previous years, as all doe/fawn harvest opportunities were eliminated (except for youth), season lengths were slightly shortened, and limited quota licenses (including non-resident quotas) were reduced. Harvest and hunter effort trends correlate well with estimated population trends. When this deer population declines, as in 2011, harvest trends decrease and hunter effort increases while the opposite trends (increase harvest and reduced hunter effort) are apparent with a population increase. Harvest rates vary among hunt areas, as hunting pressure and harvest is typically highest in Hunt Areas 142, 152, and 154, partially attributed to higher deer densities and little to no wilderness area limitations.

Population

The WGFD changed modeling techniques for all of our big game herd units, effective July 2012. The new spreadsheet model designed by the Colorado Division of Wildlife uses harvest sex/age ratios, and survival data. The Time-Specific Juvenile and Constant Adult Survival (TSJ,CA) Model showed the best overall fit compared to the other models (Fit = 77 and Relative AICc = 169) resulting in a 2013 postseason population estimate of approximately 23,000 deer. The TSJ,CA model appears to have a reasonable population estimate, in addition observed male:female ratios track very well. This 2013 population estimate is 28% below the desired objective of 32,000 for this herd unit.

Management Summary

The combination of fluctuating reproductive rates, fawn survival, natural gas development impacts on the Mesa winter complex, and habitat conditions are the primary factors regulating population trends in the Sublette herd unit. The winter/spring losses (fawns and adults) during 2010-11 reduced this population to one of lowest levels ever documented. In addition to years with large winter die-off, other population setbacks have been common in this herd and are primarily attributed to poor fawn survival and poor forage conditions on winter ranges. Overall habitat conditions remain poor, but conditions have improved in certain years. Although the current management direction is for maximum population growth (no female harvest), female harvest will be necessary at some point in the future to offset further degradation of crucial winter habitats and poor survival rates. Population estimates indicate the population is 28% below the objective of 32,000 and without multiple years of good forage production and over-winter fawn survival, this herd will most likely not gain any significant growth. Buck ratios are meeting herd goals (special status; 30-45 bucks:100 does), suggesting this herd should be able sustain current buck harvest levels.

A general license deer season for most hunt areas (except Areas 141/162) will open on September 15, antlered only, and close October 7. Doe/fawn harvest opportunities will be the same as in 2012 and 2013, as only youth hunters will be allowed to harvest doe/fawn deer. There will be the same white-tailed deer season of 50 limited quota (Type 3) licenses valid for any white-tailed deer, October 1 – November 30 in Areas 138-140, 142, and 143. Limited quota (Type 1) licenses in hunt areas 141 and 162 will remain the same at 100 licenses. Limited quota (Type 1) licenses in hunt area 130 will remain the same at 25 licenses with an October 15 to October 31 season. A total of 75 limited quota doe/fawn licenses (Type 6) in Area 130 are available to address damage concerns on private lands near Farson. The nonresident Region H quota remains the same at 800 licenses. The 2014 season is projected to harvest approximately 1,550 deer (1500 bucks, 50 doe/fawns) while allowing for population growth in this herd unit.

INPUT	
Species:	Deer
Biologist:	Dean Clause
Herd Unit & No.:	Sublets (MD104)
Model date:	2/20/2014 (Model#3)

Clear form

MODELS SUMMARY			Notes
	Fit	Relative AICc	
CJ,CA	426	435	Check best model to create report
SCJ,SCA	237	253	<input type="checkbox"/> CJ,CA Model
TSJ,CA	77	169	<input type="checkbox"/> SCJ,SCA Mod <input checked="" type="checkbox"/> TSJ,CA Model

Year	Population Estimates from Top Model										Objective
	Posthunt Population Est.		Trend Count		Predicted Prehunt Population		Predicted Posthunt Population		Total		
	Field Est	Field SE	Juveniles	Total	Juveniles	Total	Juveniles	Total	Males	Females	
1993			6294	5227	4516	20785	5178	3303	10348	18829	
1994			8699	7122	4951	22616	7122	3491	10542	21155	
1995			8080	6696	5473	23237	6696	4058	11068	21822	
1996			6507	7844	5229	23865	7844	3630	10792	22266	
1997			7338	9166	5234	25317	9166	4091	10899	24155	
1998			9309	8354	6440	26637	8354	4403	11843	24600	
1999			8593	10452	7253	30862	10441	4527	13132	28100	
2000			8742	12208	8291	35619	12183	5001	14871	32056	
2001			11227	11171	8337	35677	11101	5271	15760	32132	
2002			8399	9701	7513	33051	9623	4518	14943	29083	
2003			10070	11300	6472	32517	11261	4298	14410	29969	
2004			8699	8682	4933	26572	8640	3075	12625	24340	
2005			8832	8333	5278	26467	8277	3521	12667	24465	
2006			9132	9361	5239	27097	9325	3538	12109	24972	
2007			10918	9850	6586	29822	9822	4534	13033	27389	
2008			8738	9192	6545	29026	9116	4967	12920	27003	
2009			9073	7624	6677	27288	7536	4874	12957	24967	
2010			9425	7724	6129	26078	7670	4380	11788	23838	
2011			5799	6310	4911	22012	6303	3850	10770	20923	
2012			7343	7880	5154	10646	7873	3779	10601	22253	
2013			8259	7590	5815	11229	7584	4144	11172	22900	
2014			8400	7712	5754	24796	7701	4104	11276	23080	
2015			8400	7794	5759	25004	7783	4109	11386	23288	
2016											
2017											
2018											
2019											
2020											
2021											
2022											
2023											
2024											
2025											

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.90		0.79	SE
1994	0.76		0.79	
1995	0.60		0.79	
1996	0.60		0.79	
1997	0.70		0.79	
1998	0.90	0.84	0.79	0.05
1999	0.90	0.80	0.79	0.05
2000	0.72	0.83	0.79	0.06
2001	0.60	0.79	0.79	0.04
2002	0.60	0.79	0.79	0.04
2003	0.27	0.79	0.79	0.06
2004	0.66	0.79	0.79	0.04
2005	0.59	0.79	0.79	0.07
2006	0.81	0.79	0.79	0.07
2007	0.60	0.78	0.79	0.07
2008	0.60	0.88	0.79	0.05
2009	0.60	0.83	0.79	0.05
2010	0.37	0.79	0.79	
2011	0.67	0.79	0.79	
2012	0.72	0.79	0.79	
2013	0.65	0.79	0.79	
2014	0.65	0.79	0.79	
2015	0.65	0.79	0.79	
2016	0.65		0.79	
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:

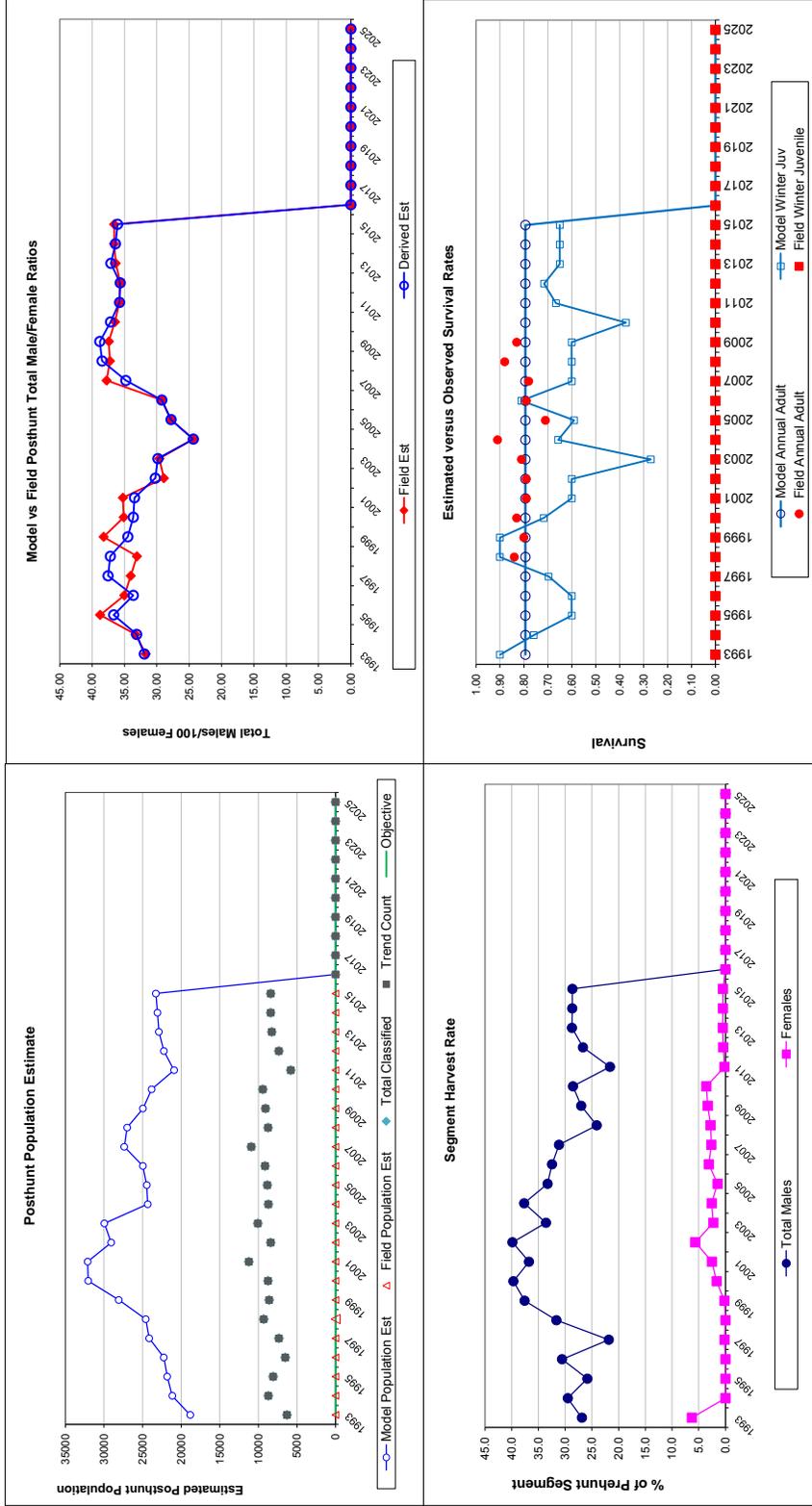
Adult Survival =	0.794
Initial Total Male Pop/10,000 =	0.330
Initial Female Pop/10,000 =	1.035

MODEL ASSUMPTIONS

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

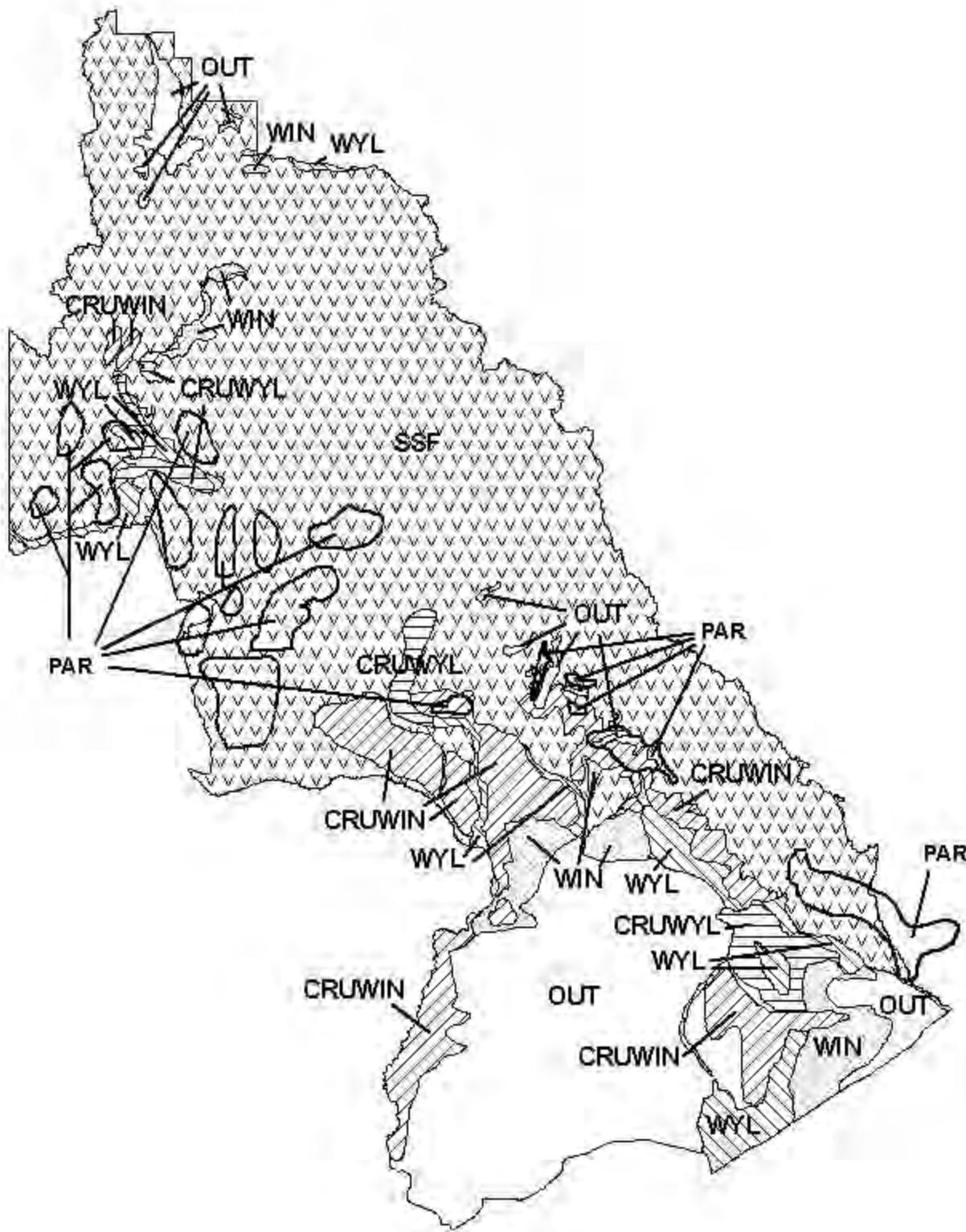
Year	Classification Counts						Harvest				
	Juvenile/Female Ratio		Total Male/Female Ratio		Juv	Males	Females	Total Harvest	Segment Harvest Rate (% of		
	Derived Est	Field Est	Field SE	Field SE					Total Males	Females	
1993	50.04	1.47	31.92	31.71	1.10	44	1103	631	1778	26.9	6.3
1994	67.56	1.62	33.11	33.29	1.01	0	1328	0	1328	29.5	0.0
1995	60.49	1.55	36.66	38.77	1.15	0	1286	0	1286	25.8	0.0
1996	72.68	2.00	33.63	35.01	1.23	0	1454	0	1454	30.6	0.0
1997	84.10	2.15	37.53	34.04	1.16	0	1039	17	1056	21.8	0.2
1998	70.54	1.62	37.18	33.07	0.98	0	1852	0	1852	31.6	0.0
1999	79.50	1.90	34.47	38.21	1.16	10	2478	23	2511	37.6	0.2
2000	81.93	1.92	33.63	35.10	1.09	22	2991	226	3239	39.7	1.6
2001	70.43	1.48	35.23	35.23	0.93	64	2757	372	3223	36.8	2.5
2002	64.40	1.56	30.23	28.91	0.89	71	2723	813	3607	39.9	5.6
2003	78.15	1.69	29.63	29.61	0.89	35	1976	305	2316	33.6	2.3
2004	68.44	1.60	24.36	24.36	0.82	38	1689	302	2029	37.7	2.6
2005	65.34	1.54	27.80	27.79	0.88	51	1597	172	1820	33.3	1.5
2006	77.01	1.75	29.22	29.22	0.92	33	1546	353	1932	32.5	3.1
2007	75.37	1.61	34.79	37.75	1.01	25	1865	322	2212	31.2	2.6
2008	70.56	1.69	38.45	37.24	1.10	69	1434	336	1839	24.1	2.8
2009	60.01	1.45	38.81	37.40	1.06	80	1639	391	2110	27.0	3.3
2010	65.06	1.52	37.15	36.45	1.03	49	1590	398	2037	28.5	3.6
2011	58.53	1.76	35.75	35.75	1.27	6	965	19	990	21.6	0.2
2012	74.27	1.92	35.65	35.65	1.18	6	1250	41	1297	26.7	0.4
2013	67.88	1.68	37.09	36.35	1.11	6	1519	51	1576	28.7	0.5
2014	68.29	1.67	36.39	36.59	1.10	10	1500	50	1560	28.7	0.5
2015	68.29	1.67	36.06	36.59	1.10	10	1500	50	1560	28.6	0.5
2016											
2017											
2018											
2019											
2020											
2021											
2022											
2023											
2024											
2025											

FIGURES



Comments: This modeling exercise assigns the juvenile constraints at 0.6 - 0.9, which tends to optimize down to a 60% fawn survival in the other models. I believe that on most years a 60% to 90% fawn survival is more representative than 40% to 90% in MD T04#2M03-2-12. Fawn Survival constraints were relaxed to 0.2 - 0.9 for those years where documented fawn loss was high. This TSJ CA model represents the overall population trends and ratio data very well with the most believable population estimates. In addition, the other models (CJ, CA and SCJ, SCA) also represent the trend and ratio data pretty well with believable population estimates, which indicates to me that this is the best overall model.

END



Mule Deer (MD104) - Sublette
 HA 130, 138-142, 146, 150-156, 162
 Revised - 3/05



2013 - JCR Evaluation Form

SPECIES: Elk
 HERD: EL104 - HOBACK
 HUNT AREAS: 86-87

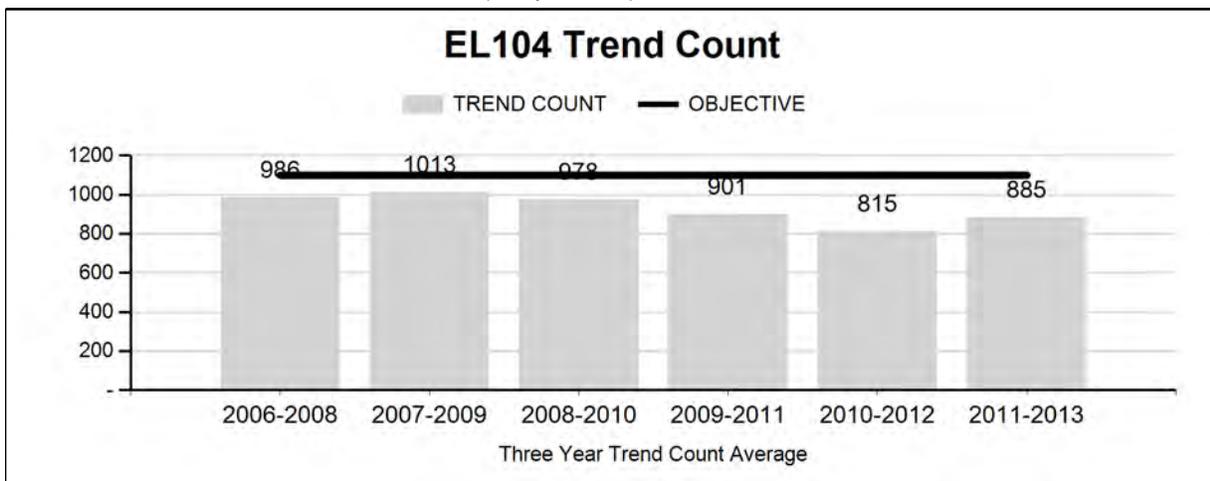
PERIOD: 6/1/2013 - 5/31/2014
 PREPARED BY: DEAN CLAUSE

	<u>2008 - 2012 Average</u>	<u>2013</u>	<u>2014 Proposed</u>
Trend Count:	909	1,047	1,100
Harvest:	253	192	200
Hunters:	826	723	700
Hunter Success:	31%	27%	29%
Active Licenses:	835	726	700
Active License Percentage:	30%	26%	29%
Recreation Days:	5,799	5,171	5,200
Days Per Animal:	22.9	26.9	26
Males per 100 Females:	20	18	
Juveniles per 100 Females	32	38	

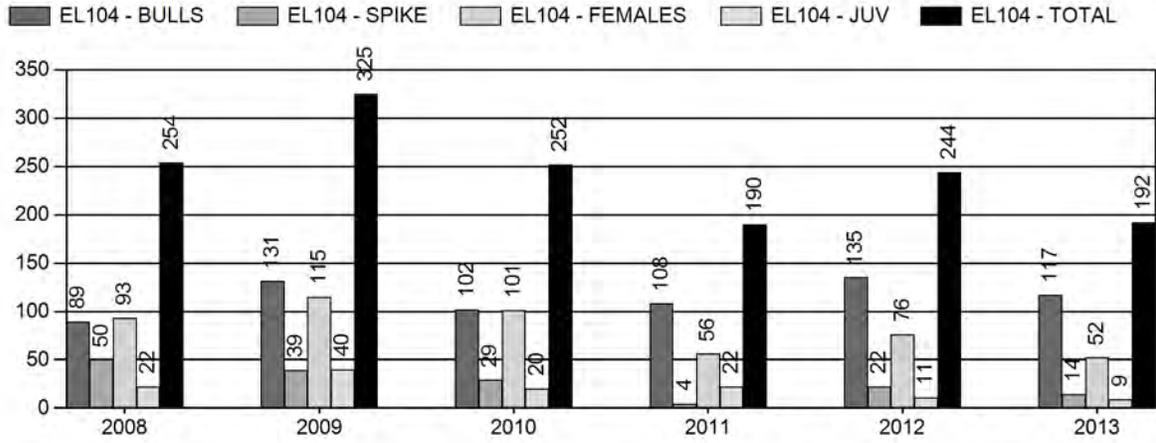
Trend Based Objective ($\pm 20\%$) 1,100 (880 - 1320)
 Management Strategy: Recreational
 Percent population is above (+) or (-) objective: -4.8%
 Number of years population has been + or - objective in recent trend: 0

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

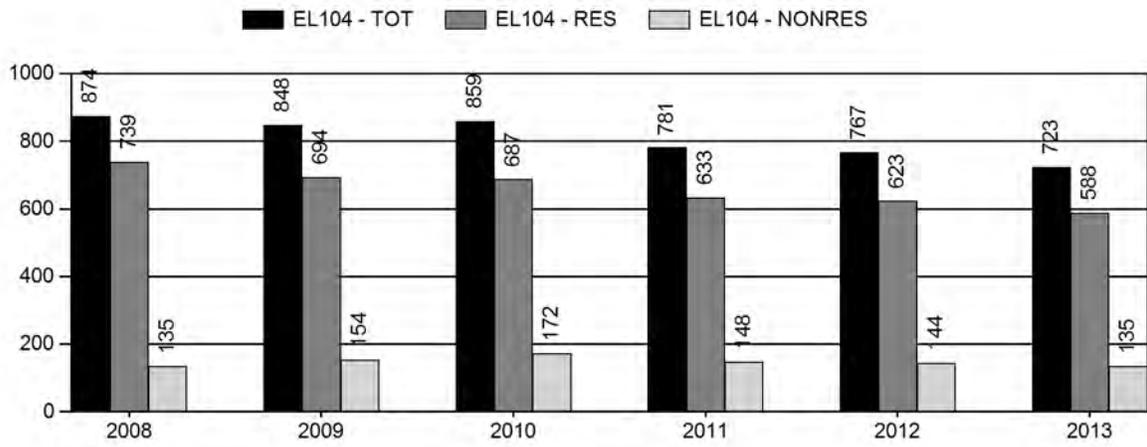
	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	0%	0%
Males ≥ 1 year old:	0%	0%
Juveniles (< 1 year old):	0%	0%



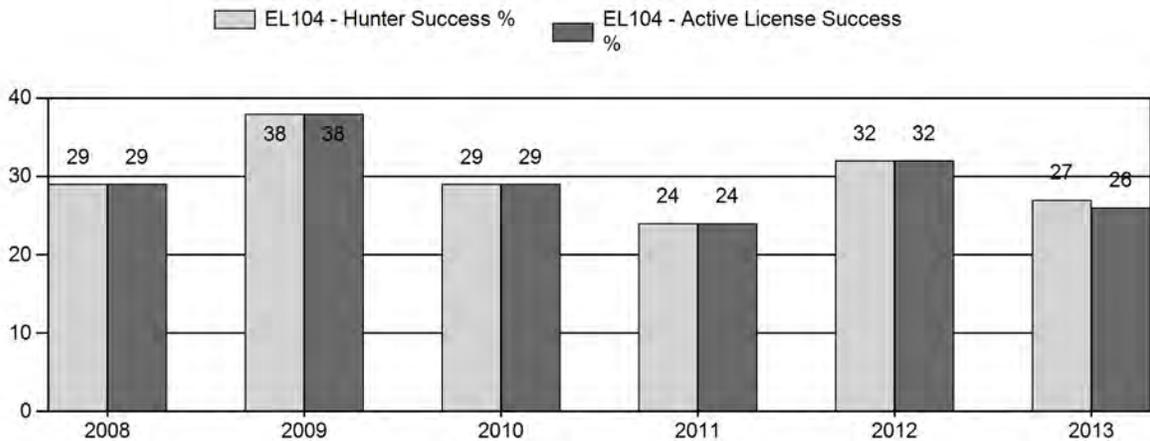
Harvest



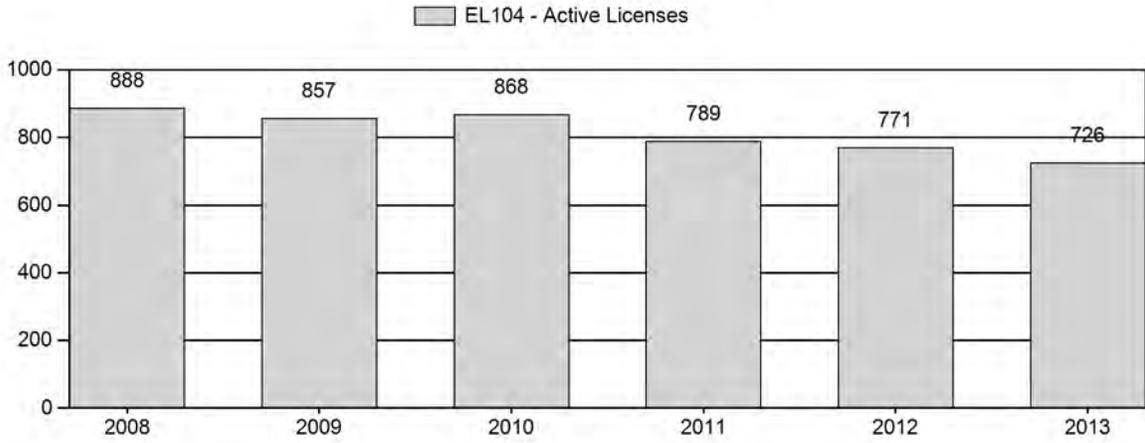
Number of Hunters



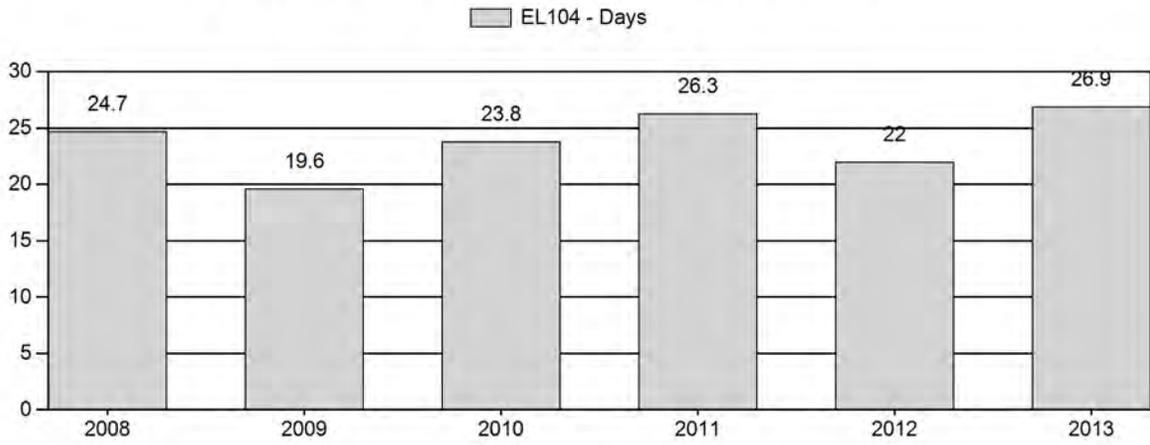
Harvest Success



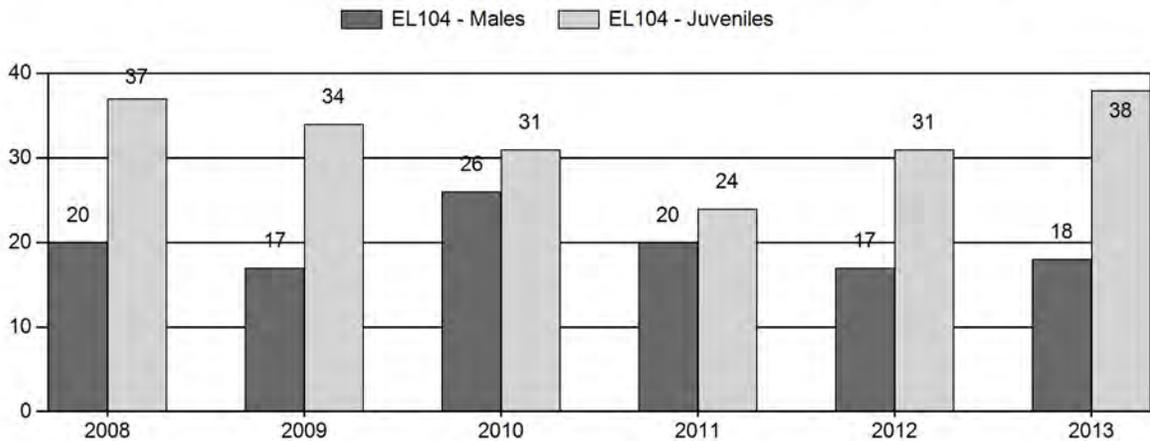
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Elk Herd EL104 - HOBACK

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot CIs	Cls Obj	Males to 100 Females			Young to			
		Ylg	Adult	Total	%	Total	%	Total	%			Yng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	1,064	66	68	134	13%	655	63%	243	24%	1,032	353	10	10	20	± 0	37	± 0	31
2009	1,076	59	55	114	11%	670	66%	229	23%	1,013	319	9	8	17	± 0	34	± 0	29
2010	850	60	80	140	17%	533	64%	164	20%	837	281	11	15	26	± 0	31	± 0	24
2011	823	45	69	114	14%	573	70%	135	16%	822	204	8	12	20	± 0	24	± 0	20
2012	0	20	70	90	11%	533	68%	164	21%	787	264	4	13	17	± 0	31	± 0	26
2013	0	55	54	109	11%	617	64%	235	24%	961	349	9	9	18	± 0	38	± 0	32

2014 Seasons – Hoback Elk Herd Unit (EL104)

Hunt Area	Type	Opens	Closes	Quota	License	Limitations
86		Sept. 26	Oct. 31		General	Any elk
87		Oct. 15	Oct. 31		General	Any elk valid in that portion of Area 87 south of U.S Hwy 191.
		Oct. 15	Oct. 31		General	Antlered elk valid in that portion of Area 87 north of U.S Hwy 191.
	6	Dec. 1	Jan. 31	25	Limited quota	Cow or calf valid south and east of Dell Creek, north and east of U.S. Highway 191, and west of the North Fork of Fisherman Creek.
Archery Seasons						
86		Sept. 1	Sept. 25			Refer to Section 3
87		Sept. 1	Sept. 30			Refer to Section 3

Summary of Proposed Changes in License Numbers

Area	Type	Changes from 2013
EL104 Totals		No Changes

Management Evaluation

Current Mid-Winter Trend Count Management Objective: 1,100

Management Strategy: Recreational

2013 Trend Count: 1047

Most Recent 3-year Running Average Trend Count: 885

The Hoback Herd Unit encompasses approximately 341 square miles of occupied elk habitat almost entirely within Sublette County. Hunt Areas 86 (Monument Ridge) and 87 (Raspberry Ridge) make up the Hoback Herd Unit. This herd unit is managed under a mid-winter trend objective of 1,100 (± 20%) with a herd estimate derived from a 3-year trend count average on

feedgrounds and native range combined. This herd is managed under “recreational” management, with a management objective for bull: 100 cow ratio of 15 to 29.

Herd Unit Issues

Managers believe a very high proportion (>90%) of elk are typically counted in this herd unit and are located on feedgrounds during the winter. This is an extremely “leaky” herd unit and as a result, a population model has not been successfully developed. Elk are annually documented moving into and out of this Hoback herd unit resulting in annual winter trend counts that can vary from year to year. In addition, the Dell Creek feedground has struggled to maintain elk numbers near the winter objective of 400 elk. Low elk numbers at Dell Creek feedground can partially be attributed to the close proximity of this feedground to the Fall Creek herd unit and summer/fall use in that adjacent herd unit where more liberal elk harvest strategies occur.

Weather

Elk in this herd unit experience the coldest winter temperatures compared to all others herd units in western Wyoming, which may result in higher feedground dependence, even on low snow years. Heavy snow loads typically make most native forage unavailable on most winters. Snow conditions were below normal this past winter (2013-14) until February when heavy snow accumulations occurred. Deep snow persisted well into late April.

Habitat

Diverse habitats from low elevation willow bottoms and sagebrush/grass, to aspen and mixed conifer, to high elevation tall forb, white-bark pine, and alpine make this herd unit rich for a wide array of wildlife. Due to the heavy snow accumulations and cold temperatures during winter, over 90% of the elk rely on supplemental feeding (feedgrounds) within this herd unit. Therefore winter and other seasonal habitats are not considered to be limiting herd dynamics in this herd unit.

Field Data

The 2013 postseason trend count of 1,047 elk observed on Department-operated elk feedgrounds and native winter ranges, showed an increase compared to a continuing declining trend since 2008 (Table 1). Very few elk (n=99) were counted away from established feedgrounds in Areas 86 and 87, which is typical for this herd unit due to climatic conditions. Over 90% of the documented elk numbers were from feedground locations.

Table 1. Herd trend counts in the Hoback Herd Unit, 2004-2013.

Location	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Dell Creek F.G.	298	258	297	311	345	298	228	205	171	242
McNeel F.G.	560	716	598	591	687	701	596	613	544	706
N.W.R.	83	70	67	38	23	44	13	4	72	99
HU Total	941	1044	962	940	1055	1043	837	822	787	1047

The 2013 postseason ratios of 18 bulls:100 cows:38 calves, shows a decrease in the bull ratio and an increase in the calf ratio compared to the 5-year average bull:cow:calf ratios of 20:100:32. The 2013 bull ratio is adequate and within management goals for this herd unit.

Harvest Data

Additional antlerless harvest opportunities were made available starting in 2008 continuing through 2011 in Area 86 and the southern portions of Area 8. Liberal seasons were designed to help reduce elk numbers from surrounding herd units, as many of these animals move into the Hoback during the spring/summer/fall period. The 2013 harvest survey indicated a total harvest of approximately 200 (140 bulls and 60 cows/calves) which decreased from the 2012 harvest. Hunter success was 26% and days/harvest was 27, compared to the 5-year average of 30% success and 23 days/harvest. The lower success and increased hunter effort in 2013 can be attributed to conservative antlerless elk seasons (primarily the north portion of Area 87) and lower elk numbers.

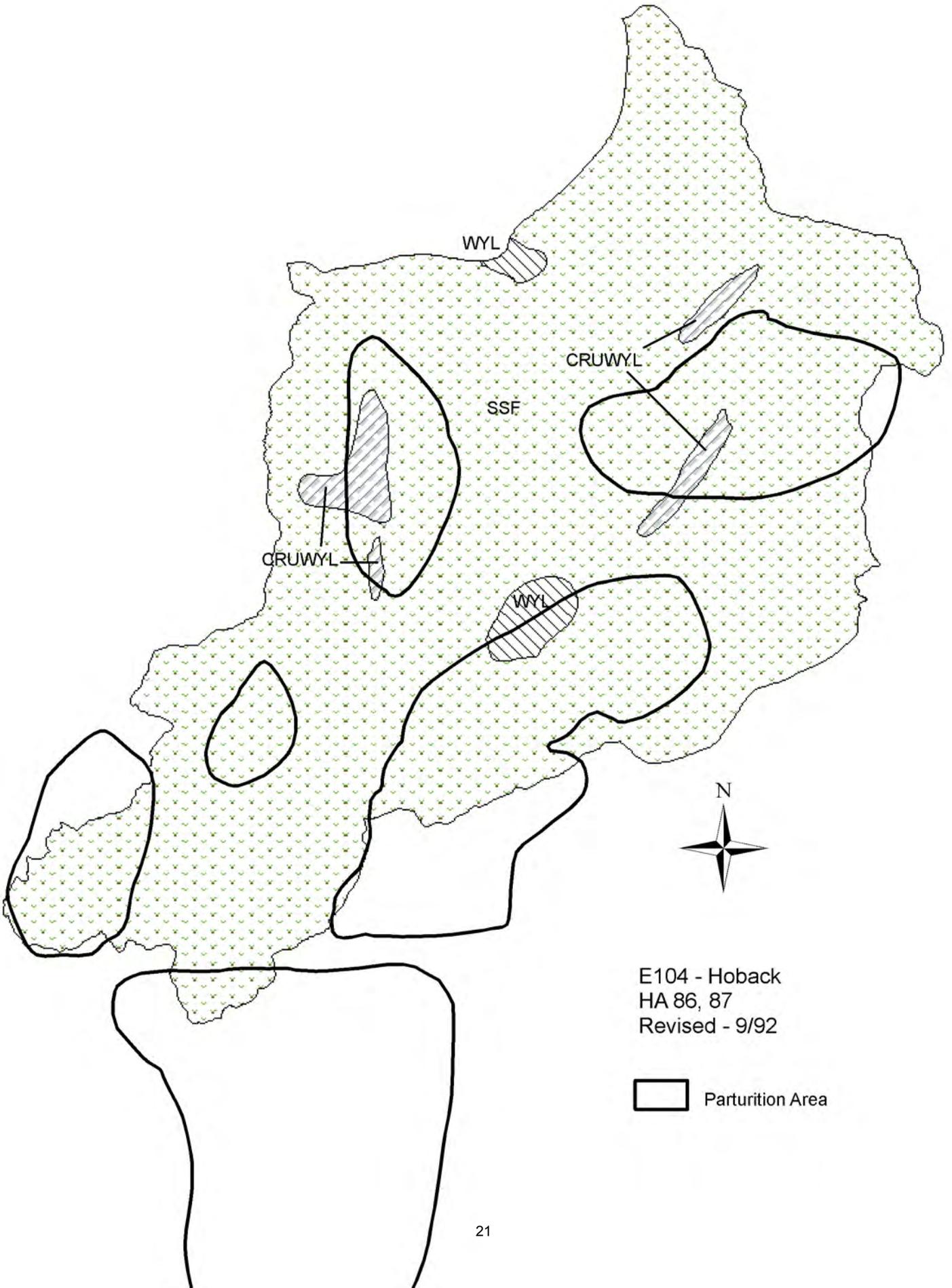
Population

Starting in 2012, a mid-winter trend count was used to manage this herd unit instead of hand-derived population model estimates. This is an extremely “leaky” herd unit and as a result, a functional computer simulation model has never been developed. The post hunt population trend objective for this herd is 1,100 elk ($\pm 20\%$). The 2011-2013 mid-winter 3-year trend count average is 885 elk, which is at the low end of the range for this herd objective.

Management Summary

The Hoback Herd Unit is extremely “leaky” in regards to elk moving in and out of the herd on a seasonal basis. Fluctuations of up to 260 animals between annual winter counts are common without any rational explanation for the changes. Radio collared (GPS) elk and harvest data from elk ear tagged at Franz (located in the Piney herd unit), McNeel, and Dell Creek feedgrounds have documented movement among herd units quite well. Ear tag data has documented 29% to 43% harvest outside the herd unit where those elk were tagged. Radio collared elk have also documented movements outside the herd units from where they were collared as follows; McNeel at 0%, Dell Creek at 63%, and Franz at 89%. Since 2008, hunting seasons were designed to increase harvest on antlerless within the Hoback herd unit as well as surrounding herd units, which can be attributed to low elk numbers during 2010-2012. In 2012 seasons were changed to reduce female harvest in response to low elk numbers during the winter of 2011-2012. Currently, adequate bull:cow:calf ratios are being maintained. The recent mid-winter 3-year trend average was 885 elk, 20% below the objective of 1,100, although the 2013 winter trend increased to 1,047. Herd management for 2014 will be similar to 2013, to reduce antlerless harvest in parts of this herd, primarily targeted in the northern portion of Area 87 to increase the postseason (winter) population.

The 2014 hunting seasons for this herd unit will be essentially the same as in 2013. In Area 87, the general license season is “any” elk hunting the entire season (Oct. 15 – Oct. 31) south of U.S. Hwy 191, but will be limited to “antlered” elk north of U.S. Hwy 191. A total of 25 limited quota Type 6 (cow/calf) licenses are available in a portion of Area 87, valid from Dec. 1 (change from Nov. 19) through January 31, in an effort to reduce damage to privately stored hay crops. The 2014 season in Area 86 offers a general license, “any” elk hunting from September 26 through October 31, same as in past years. The 2013 hunting seasons are projected to harvest approximately 200 elk (140 bulls, 60 cows/calves).



E104 - Hoback
HA 86, 87
Revised - 9/92

 Parturition Area

2013 - JCR Evaluation Form

SPECIES: Elk
 HERD: EL106 - PINEY
 HUNT AREAS: 92, 94

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

PREPARED BY: GARY FRALICK

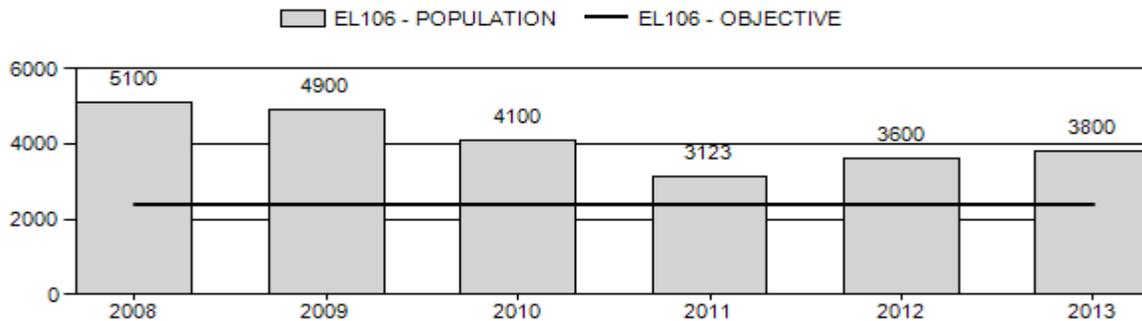
	<u>2008 - 2012 Average</u>	<u>2013</u>	<u>2014 Proposed</u>
Population:	4,165	3,800	2,800
Harvest:	954	1,123	1,147
Hunters:	3,065	3,312	3,400
Hunter Success:	31%	34%	34%
Active Licenses:	3,212	3,471	3,400
Active License Percent:	30%	32%	34%
Recreation Days:	25,336	29,585	31,201
Days Per Animal:	26.6	26.3	27.2
Males per 100 Females	30	46	
Juveniles per 100 Females	33	33	

Population Objective: 2,400
 Management Strategy: Recreational
 Percent population is above (+) or below (-) objective: 58%
 Number of years population has been + or - objective in recent trend: 10
 Model Date: 02/23/2014

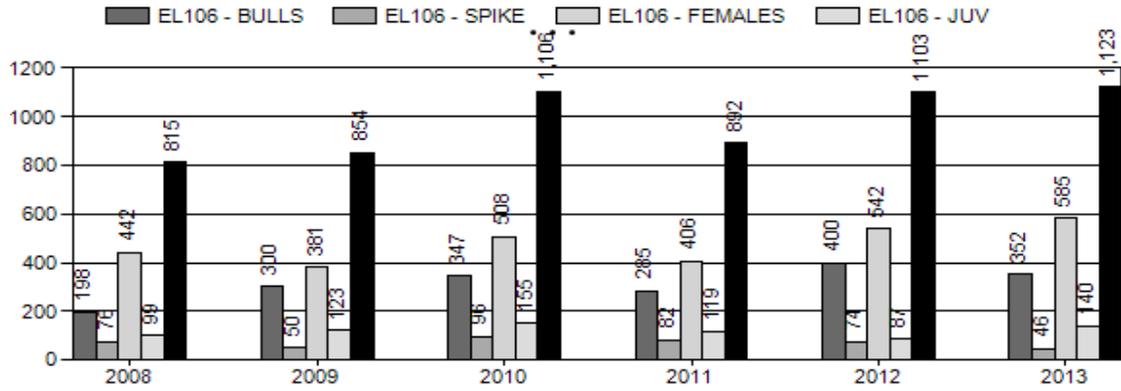
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	26%	31%
Males ≥ 1 year old:	30%	34%
Juveniles (< 1 year old):	17%	18%
Total:	21%	30%
Proposed change in post-season population:	-16%	-24%

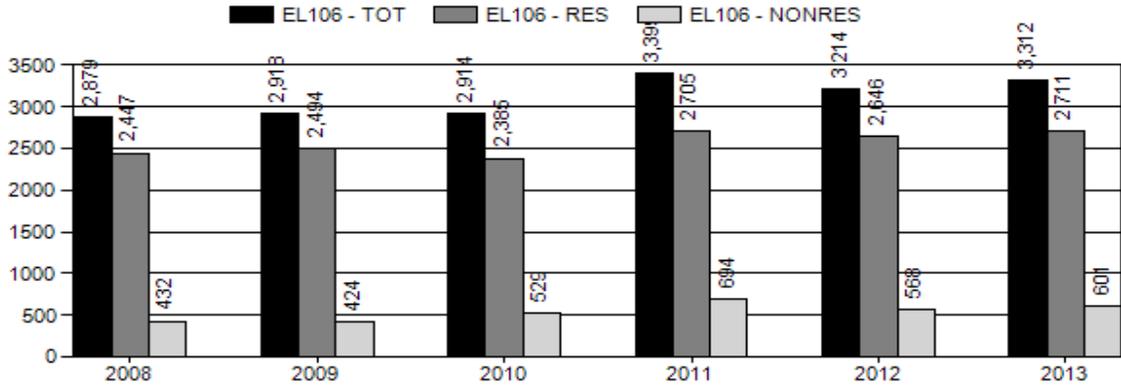
Population Size - Postseason



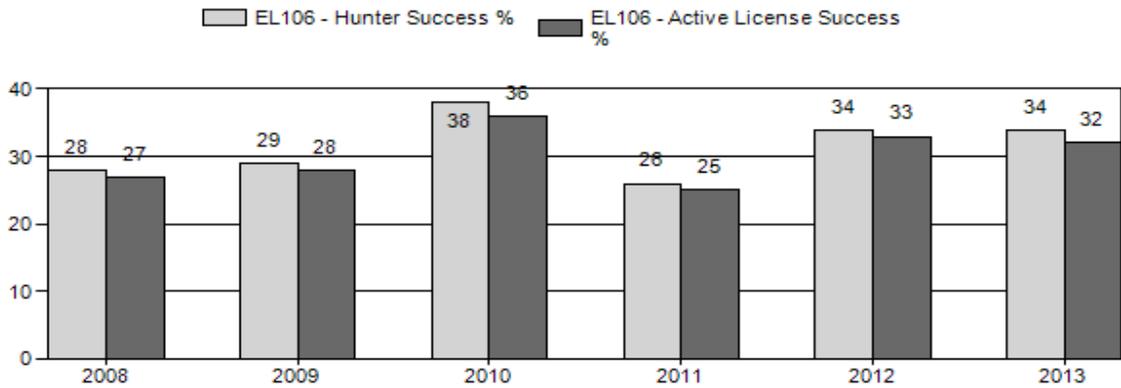
Harvest



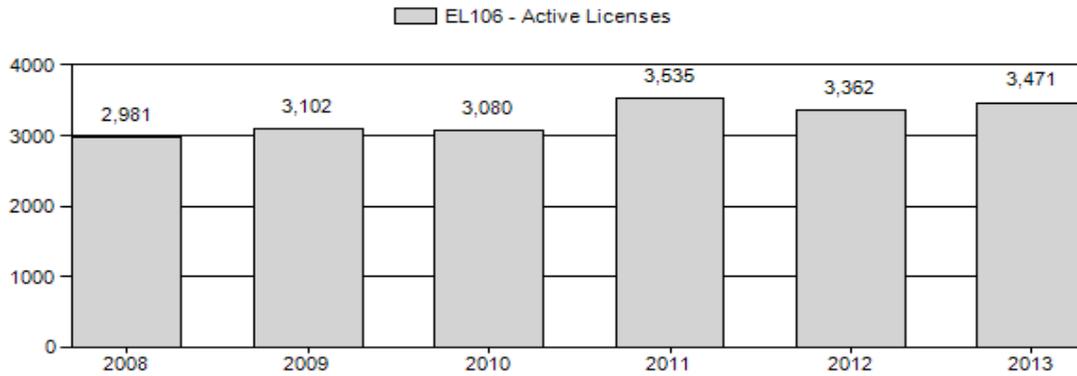
Number of Hunters



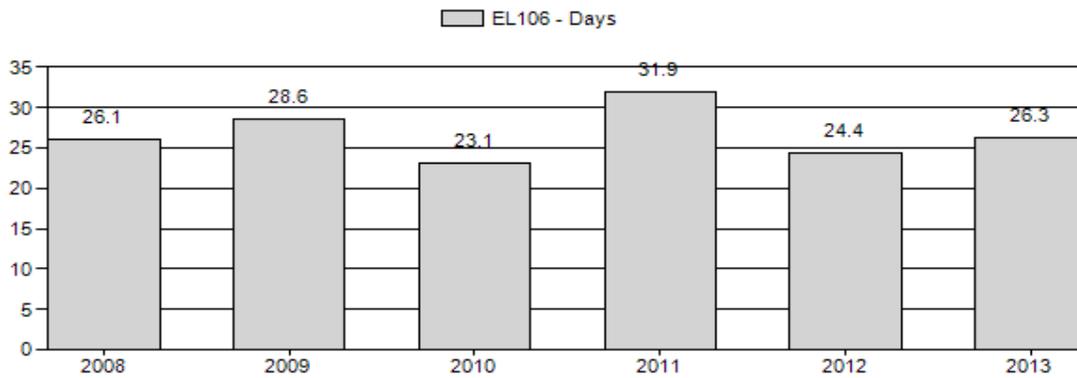
Harvest Success



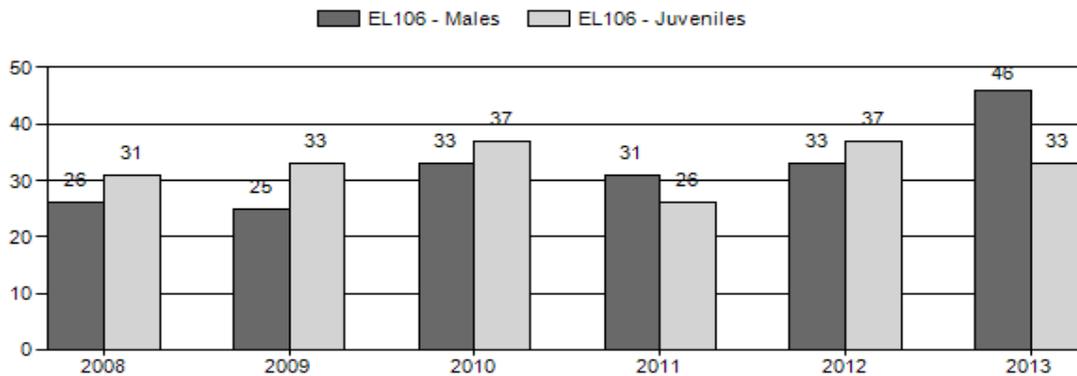
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Elk Herd EL106 - PINEY

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot CIs	Cls Obj	Males to 100 Females			Young to			
		Ylg	Adult	Total	%	Total	%	Total	%			Yng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	5,100	255	243	498	17%	1,887	64%	585	20%	2,970	383	14	13	26	± 1	31	± 1	25
2009	4,900	190	216	406	16%	1,618	63%	539	21%	2,563	403	12	13	25	± 1	33	± 1	27
2010	4,100	199	357	556	19%	1,683	59%	621	22%	2,860	0	12	21	33	± 1	37	± 1	28
2011	3,123	217	302	519	20%	1,660	64%	425	16%	2,604	369	13	18	31	± 1	26	± 1	20
2012	3,600	261	306	567	19%	1,705	59%	639	22%	2,911	0	15	18	33	± 1	37	± 1	28
2013	3,800	240	380	620	26%	1,337	56%	443	18%	2,400	0	18	28	46	± 2	33	± 1	23

2014 HUNTING SEASON

**SPECIES: ELK
(EL106)**

HERD UNIT: PINEY

<u>HUNT AREA</u>	<u>TYPE</u>	<u>OPENS</u>	<u>CLOSES</u>	<u>QUOTA</u>	<u>LIMITATIONS</u>
92		Oct. 15	Oct. 31		General license; Any elk – SEE SECTION 6.
		Nov. 1	Nov. 23		General license; Antlerless elk – SEE SECTION 6.
	6	Oct. 1	Nov. 23	500	Limited quota; Cow or calf – SEE SECTION 6.
	6	Nov. 24	Jan. 31		Unused Area 92 Type 6 licenses valid off national forest east of Sublette County Roads 115, 116 and 117 and south of the North Beaver Road – SEE SECTION 6.
94		Oct. 15	Oct. 31		General license; Any elk – SEE SECTION 6.
		Nov. 1	Nov. 23		General license; Antlerless elk – SEE SECTION 6.
	6	Oct. 1	Nov. 23	450	Limited quota; Cow or calf – SEE SECTION 6.

	Dec. 1	Jan. 31		Unused Area 94 Type 6 and Type 7 licenses valid on the Big Piney Hunter Management Area (HMA permission slip required) – SEE SECTION 6.	
	7	Nov. 1	Nov. 31	100	Limited Quota; Cow or calf valid north of Middle Piney Creek – SEE SECTION 6.
92, 94	Sep. 1	Sep. 30			General license; Archery only – SEE SECTION 3.

SUMMARY OF CHANGES BY LICENSE NUMBER

Area	Type	Change from 2013
92	Gen.Antlerless	Eliminates Oct.1 – Oct. 14 hunt
92	Gen.Antlerless	Change closing dates from Nov. 24 to Nov. 23
92	Limited Type 6	Changes closing dates from Nov. 24 to Nov. 23
94	Gen. Antlerless	Eliminates Oct. 1 – Oct. 14 hunt
94	Gen. Antlerless	Changes closing date from Nov. 24 to Nov. 23; eliminates area that portion of the area north of Middle Piney Creek, Nov. 1-24
94	Limited Type 6	Eliminates Nov. Unused LQ Type 6 licenses valid only in area north of Middle Piney Creek; reduces Type 6 licenses from 550 to 450 licenses
94	Limited Type 7	Adds 100 Limited Quota Type 7 cow/calf only hunt valid in a portion of the area during November
Herd Unit Total	Limited quota licenses	No Net Change

Management Evaluation

Current Postseason Population Management Objective: 2,400

Management Strategy: Recreational

2013 Postseason Population Estimate: ~3,800

2014 Proposed Postseason Population Estimate: ~2,800

The population objective for Piney elk herd is 2400 elk. The management strategy is recreational management. The objective and management strategy were last revised in 2011. The current population estimate is 3800 elk.

Herd Unit Issues

Since 2005 sustained population reduction has been difficult to achieve. Hunting opportunities are some of the most liberal in western Wyoming. Management strategies have emphasized hunter opportunity by promoting antlerless elk harvest with November hunting seasons and issuance of limited quota cow/calf only licenses. While both hunt areas continue to support winter elk numbers at or above Commission-established feedground quotas, Area 94, and specifically the Bench Corral feedground that has supported the highest increase in elk.

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. 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

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 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, pages 104-123 for Pinedale Region habitat improvement project summaries (<http://wgfd.wyo.gov/web2011/wildlife-1000708.aspx>).

Field Data

Since 2005, sustained and significant population reduction has been difficult to achieve. Management strategies have emphasized the harvest of antlerless elk with November hunting seasons and issuance of limited quota cow/calf licenses. While both hunt areas continue to support winter elk numbers at or above Commission-established feedground quotas, Area 94, and specifically the Bench Corral feedground, has supported the highest increase in elk. Consequently, hunting opportunities, especially for antlerless elk in Area 94 where trend counts continue to remain high, will continue to be liberal in order to affect the desired population reduction. Limited quota Type 6 cow/calf licenses will focus on the antlerless segment of the population since these license holders typically account for at least 50% of the antlerless harvest in the herd unit.

Harvest Data

Hunter success was estimated at 34% in 2013 with a total harvest over 1100 elk. General license hunters accounted for 69% of the total elk harvest, and 52% of the total antlerless harvest. Limited quota Type 6 license holders accounted for 48% of the total antlerless elk harvest. The relatively high number of additional cow/calf only licenses issued resulted in a substantial harvest of antlerless elk. The majority of this harvest likely occurred in November, and affirms the management strategy to promote antlerless harvest when elk are more likely to be present at lower elevation and accessible to hunters. The added dimension of harvesting antlerless elk with Type 6 licenses other than general hunting opportunity will assist in reducing this population. Antlerless hunting is an essential component of the elk management strategy; managing the reproductive segment of the population will continue to emphasize cow harvest with limited quota licenses holders during the months of October and November. The management goal of maintaining the postseason bull: cow ratios of at least 20 bulls:100 cows have been achieved.

Population

The population trend is decreasing, but only slightly. The “Constant Juvenile and Adult Survival – CJ,CA Model” spreadsheet model was chosen for the post season population estimate. This model provides the best model alignment with low AICc value of 365 and fit of 356. This model also tracks reasonably with observed bull:cow ratios, bull harvest percentages, and annual population dynamics.

Management Summary

The 2014 hunting seasons are designed to reduce the Piney elk toward the objective of 2400 elk. The emphasis to harvest adult female elk in both hunt areas will continue for the 7th consecutive year by opening the limited quota antlerless elk hunting on October 1. In addition, the number of

days for the November portion of the antlerless elk hunting season will extend to November 23 for general license hunters and limited quota Type 6 hunters. The number of limited quota Type 6 licenses available in 2014 will remain at 950 additional cow/calf licenses. A total of 500 and 550 Type 6 licenses will be available in Areas 92 and 94, respectively.

A substantial change in the 2014 hunt in Area 94 will be an effort to shift the hunting pressure north of Middle Piney Creek with a newly implemented limited quota Type 7 cow/calf license which will be valid during November 1 – 30. This hunt is designed to focus harvest on that segment of the population that spends the winter on the Bench Corral feedground. For the 3rd consecutive year, hunters will be permitted to harvest up to three elk in this herd.

The 2014 hunting seasons are projected to harvest 1100 elk. The 2014 posthunt population estimate should be approximately 2800 elk.

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

Clear form

MODELS SUMMARY		Relative AICc	Fit	Notes
CJ,CA	Constant Juvenile & Adult Survival	365	356	
SC,J,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	43576	43567	
TS,J,CA	Time-Specific Juvenile & Constant Adult Survival	378	263	
TS,J,CA,MSC	Time-Specific Juv, Constant Adult Survival, Male survival coefficient	299854	299843	

Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population		Predicted Posthunt Population		Total	Objective	
	Field Est	Field SE		Juveniles	Total Males	Females	Total Males			Females
1993				1204	1335	3106	955	1160	2878	4993
1994				1603	1430	3282	736	1494	2833	5063
1995				1350	1366	3386	1024	1279	3181	5483
1996				1422	1548	3626	1203	1353	3213	5770
1997				1059	1754	3690	1267	937	3151	5354
1998				1245	1632	3446	1151	1159	2960	5271
1999				1417	1619	3360	1002	1299	2953	5254
2000				1201	1536	3416	985	1044	2747	4776
2001				1079	1408	3105	944	1006	2792	4741
2002				1060	1351	3131	1021	979	2910	4911
2003				1063	1414	3233	1026	985	2985	4995
2004				1295	1421	3307	945	1183	2911	5039
2005				1369	1430	3324	1081	1335	3144	5560
2006				1475	1628	3615	1162	1162	3257	5783
2007				1378	1719	3737	1235	1244	3317	5796
2008				1118	1737	3741	1435	1009	3255	5700
2009				1188	1826	3579	1441	1053	3160	5654
2010				1258	1851	3506	1364	1087	2947	5398
2011				852	1792	3316	1389	734	2865	4988
2012				1029	1660	3082	1130	932	2488	4551
2013				870	1499	2806	870	687	2075	3816
2014				536	1318	2300	870	437	1585	2892
2015				509	1030	1719	599	443	1301	2343
2016										
2017										
2018										
2019										
2020										
2021										
2022										
2023										
2024										
2025										

Survival and Initial Population Estimates

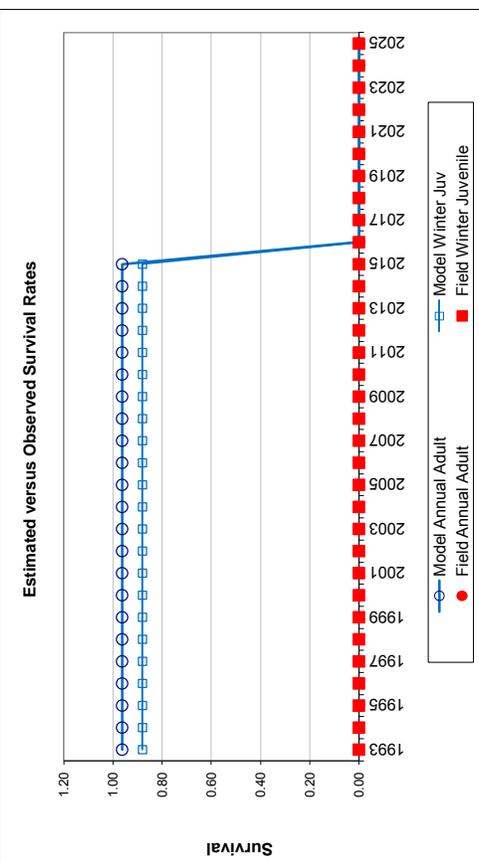
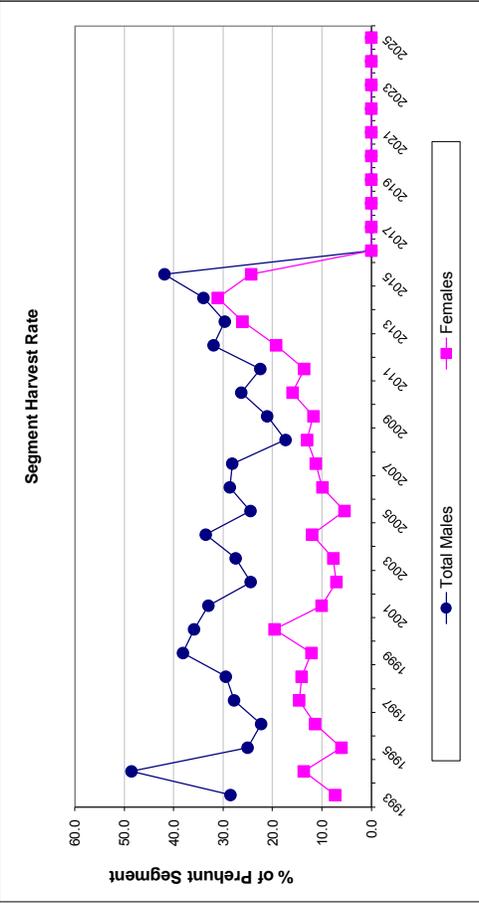
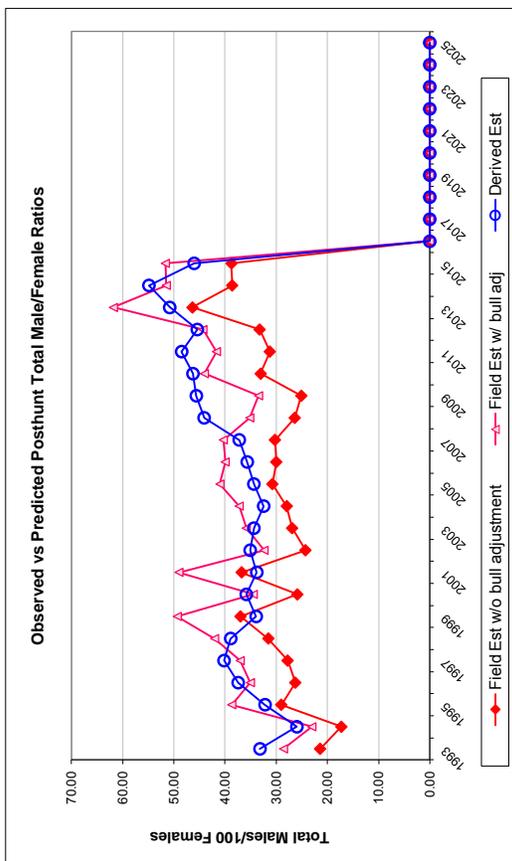
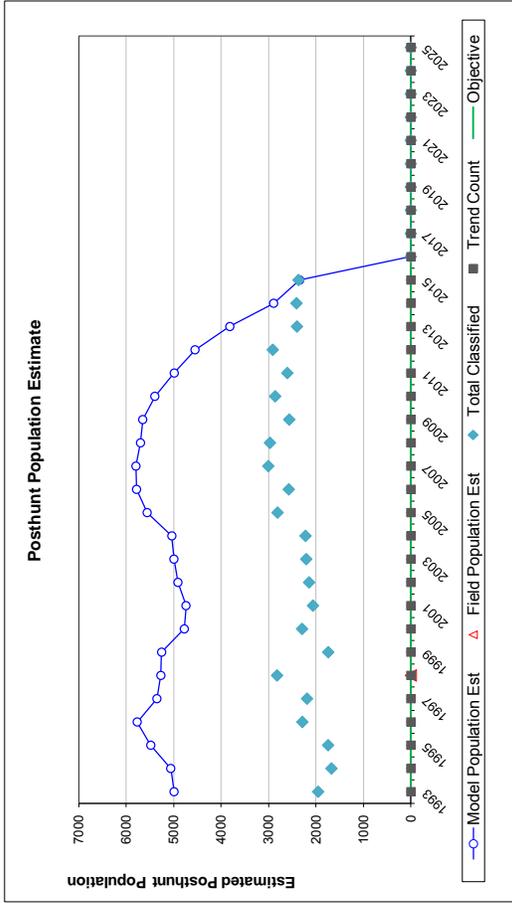
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.88		0.96	
1994	0.88		0.96	
1995	0.88		0.96	
1996	0.88		0.96	
1997	0.88		0.96	
1998	0.88		0.96	
1999	0.88		0.96	
2000	0.88		0.96	
2001	0.88		0.96	
2002	0.88		0.96	
2003	0.88		0.96	
2004	0.88		0.96	
2005	0.88		0.96	
2006	0.88		0.96	
2007	0.88		0.96	
2008	0.88		0.96	
2009	0.88		0.96	
2010	0.88		0.96	
2011	0.88		0.96	
2012	0.88		0.96	
2013	0.88		0.96	
2014	0.88		0.96	
2015	0.88		0.96	
2016	0.88		0.96	
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:		Optim cells
Juvenile Survival =		0.880
Adult Survival =		0.963
Initial Total Male Pop/10,000 =		0.095
Initial Female Pop/10,000 =		0.288

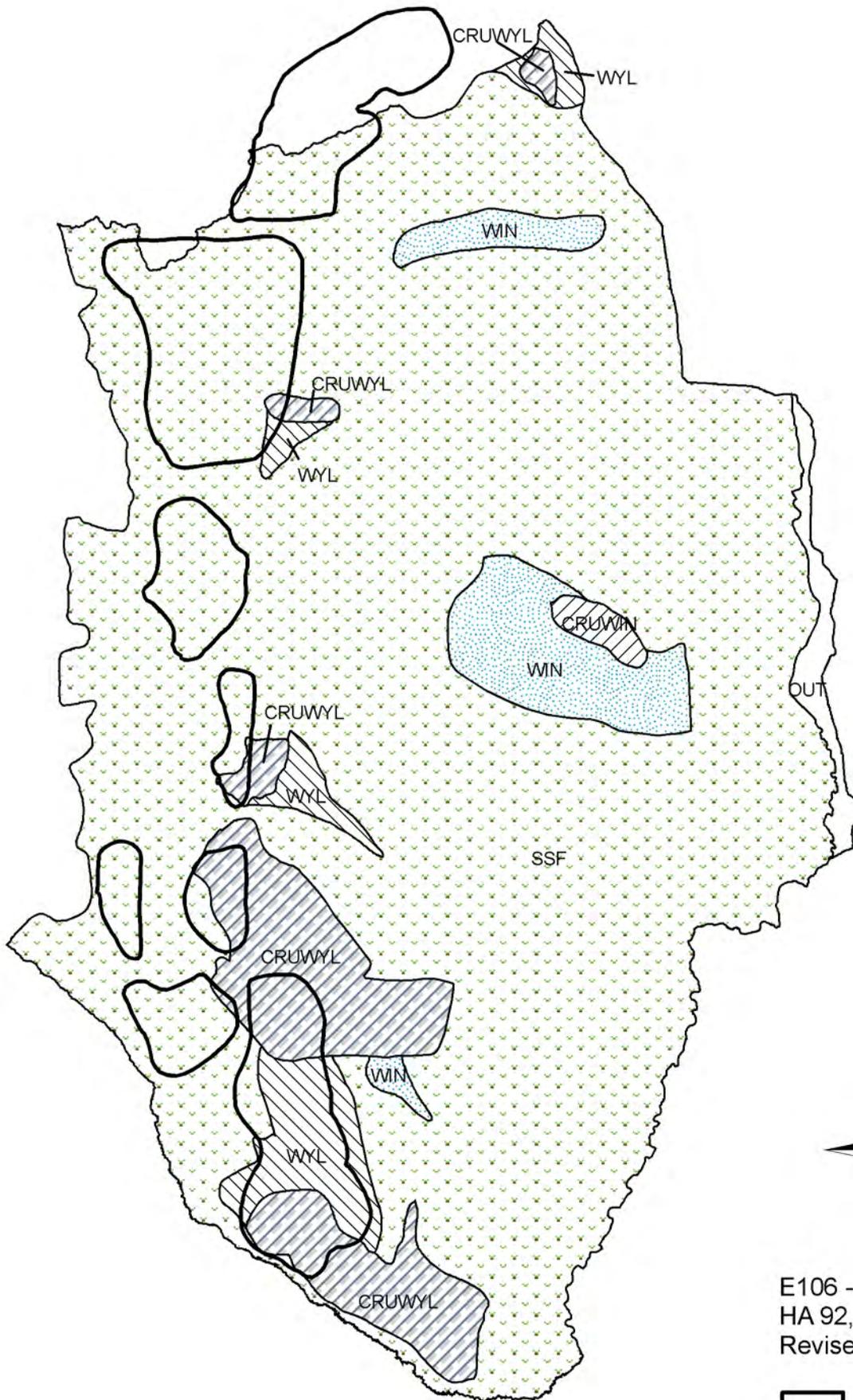
MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Total Bulls Adjustment Factor	75%

Year	Classification Counts										Harvest				
	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		40.31	2.16	33.17	28.59	21.44	1.47	40	116	230	207	593	28.5	7.3	
1994		52.74	2.86	25.97	23.04	17.28	1.43	99	144	487	408	1138	48.5	13.7	
1995		40.19	2.94	32.18	38.71	29.03	1.91	65	120	191	186	562	25.0	6.0	
1996		42.12	2.10	37.44	35.05	26.29	1.56	62	74	240	375	751	22.3	11.4	
1997		29.73	1.67	40.20	37.05	27.79	1.60	111	156	287	490	1044	27.8	14.6	
1998		39.16	1.82	38.89	42.05	31.54	1.58	78	109	328	442	957	29.5	14.1	
1999		43.97	2.57	33.91	49.34	37.01	2.30	108	138	423	370	1039	38.1	12.1	
2000		38.03	1.94	35.85	34.50	25.88	1.53	142	106	395	608	1251	35.9	19.6	
2001		36.01	2.03	33.80	49.02	36.77	2.05	67	117	305	284	773	33.0	10.1	
2002		33.65	1.82	35.09	32.40	24.30	1.49	73	53	247	201	574	24.4	7.1	
2003		32.99	1.78	34.38	35.87	26.90	1.57	71	84	269	226	650	27.5	7.7	
2004		40.62	2.08	32.46	37.26	27.94	1.65	102	77	356	360	895	33.5	12.0	
2005		42.48	1.93	34.37	41.02	30.76	1.57	31	76	242	164	513	24.5	5.4	
2006		41.88	1.99	35.67	39.99	29.99	1.61	101	91	333	325	850	28.6	9.9	
2007		37.52	1.70	37.24	40.35	30.26	1.48	121	111	329	382	943	28.2	11.2	
2008		31.00	1.47	44.10	35.19	26.39	1.33	99	76	198	442	815	17.4	13.0	
2009		33.31	1.66	45.62	33.46	25.09	1.39	123	50	300	381	854	21.1	11.7	
2010		36.90	1.73	46.28	44.05	33.04	1.62	155	96	347	508	1106	26.3	15.9	
2011		25.60	1.39	48.48	41.69	31.27	1.57	108	84	282	410	884	22.5	13.6	
2012		37.48	1.74	45.43	44.34	33.26	1.61	88	75	407	540	1110	31.9	19.3	
2013		33.13	1.82	50.82	61.83	46.37	2.25	166	48	356	665	1235	29.7	26.1	
2014		27.59	1.56	54.88	51.49	38.62	1.92	90	77	330	650	1147	34.0	31.1	
2015		34.09	1.83	46.04	51.68	38.76	1.98	60	67	325	380	832	41.9	24.3	
2016															
2017															
2018															
2019															
2020															
2021															
2022															
2023															
2024															
2025															

FIGURES



Comments:



E106 - Piney
 HA 92, 94
 Revised - 12/88

 Parturition Area

2013 - JCR Evaluation Form

SPECIES: Elk

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

HERD: EL107 - UPPER GREEN RIVER

HUNT AREAS: 93, 95-96

PREPARED BY: DEAN CLAUSE

	<u>2008 - 2012 Average</u>	<u>2013</u>	<u>2014 Proposed</u>
Trend Count:	2,534	2,787	2,600
Harvest:	411	453	500
Hunters:	1,151	1,223	1,250
Hunter Success:	36%	37%	40%
Active Licenses:	1,206	1,310	1,350
Active License Percentage:	34%	35%	37%
Recreation Days:	9,070	11,064	10,500
Days Per Animal:	22.1	24.4	21
Males per 100 Females:	28	26	
Juveniles per 100 Females	30	31	

Trend Based Objective (± 20%)

2,500 (2000 - 3000)

Management Strategy:

Recreational

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

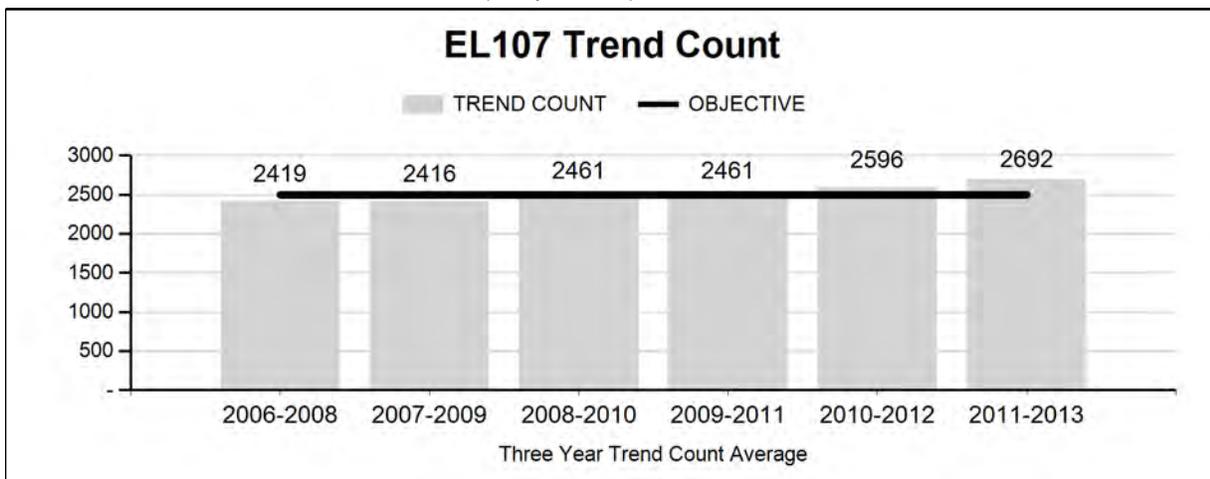
11%

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

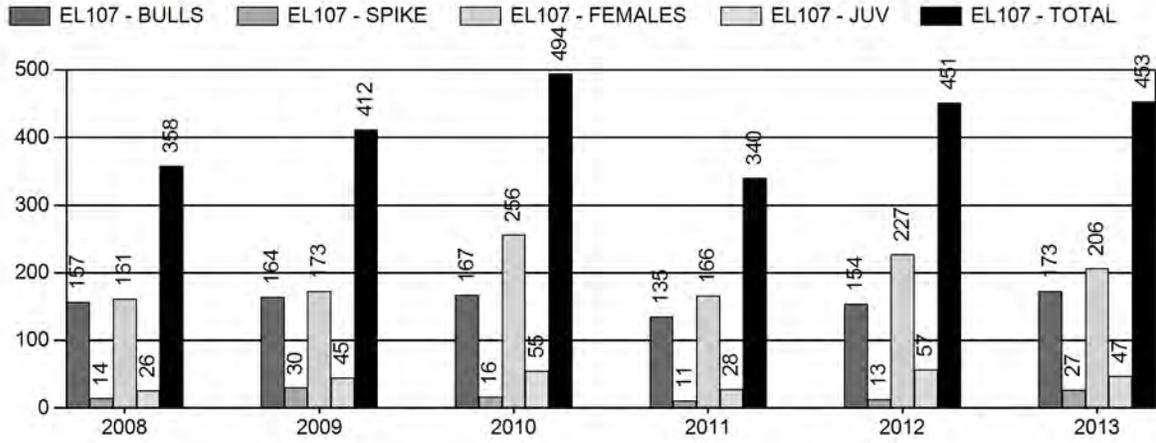
0

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

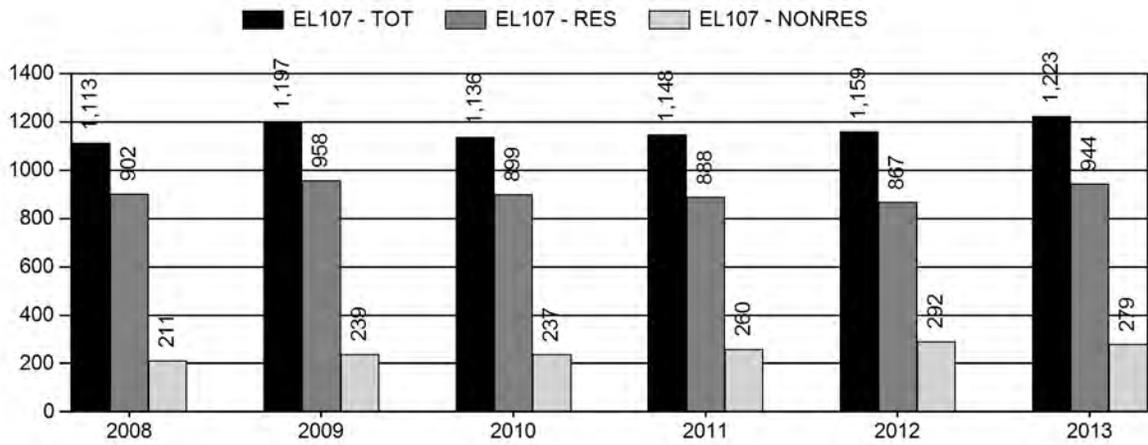
	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	0%	0%
Males ≥ 1 year old:	0%	0%
Juveniles (< 1 year old):	0%	0%



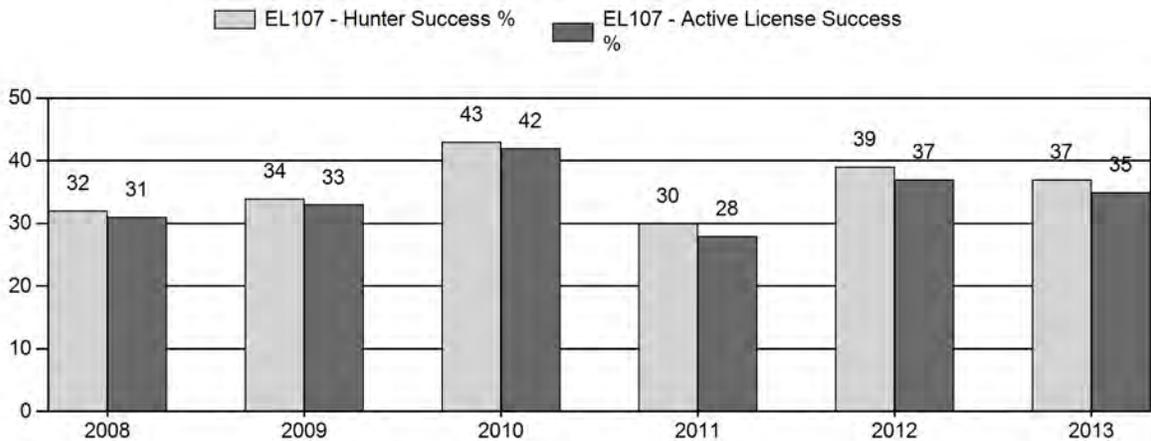
Harvest



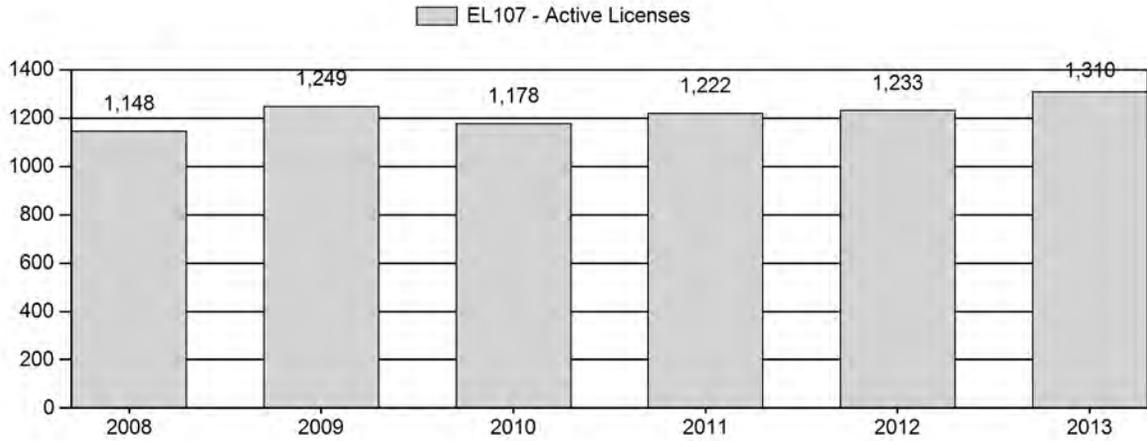
Number of Hunters



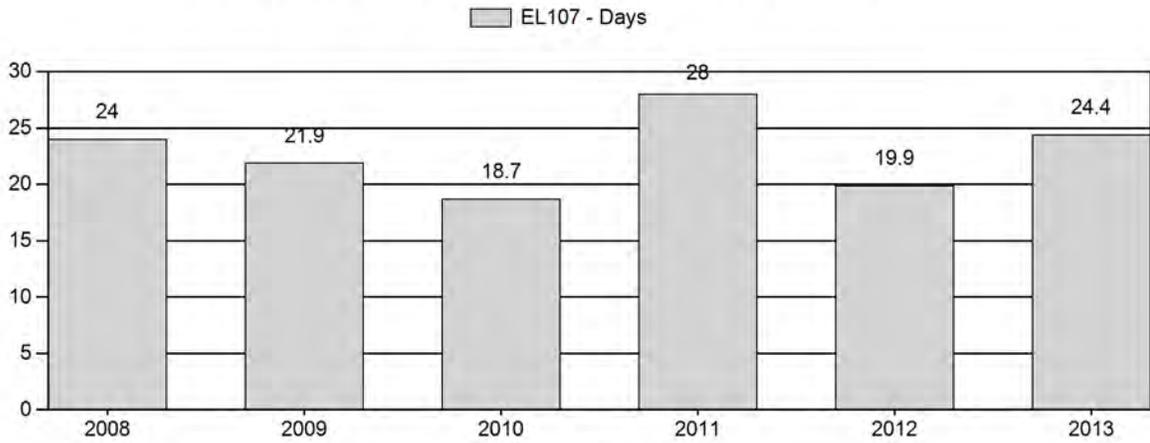
Harvest Success



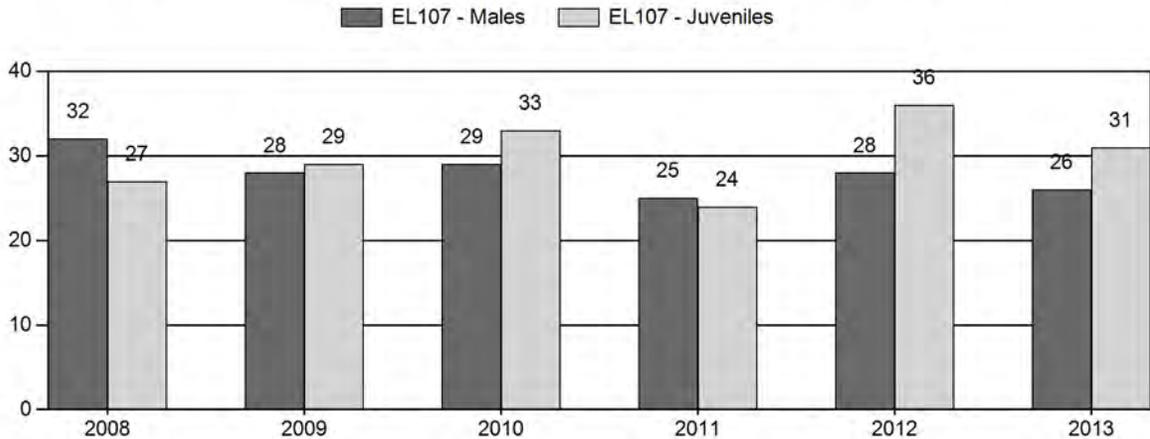
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Elk Herd EL107 - UPPER GREEN RIVER

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot CIs	Cls Obj	Males to 100 Females			Young to			
		Ylg	Adult	Total	%	Total	%	Total	%			Yng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	2,688	180	318	498	20%	1,561	63%	422	17%	2,481	380	12	20	32	± 0	27	± 0	20
2009	2,639	134	241	375	18%	1,328	64%	384	18%	2,087	337	10	18	28	± 1	29	± 1	23
2010	2,550	173	273	446	18%	1,547	62%	506	20%	2,499	393	11	18	29	± 0	33	± 0	25
2011	2,621	159	270	429	17%	1,736	67%	417	16%	2,582	274	9	16	25	± 0	24	± 0	19
2012	0	180	278	458	17%	1,649	61%	599	22%	2,706	441	11	17	28	± 0	36	± 0	28
2013	0	208	254	462	17%	1,777	64%	548	20%	2,787	364	12	14	26	± 0	31	± 0	24

2014 Proposed Seasons – Upper Green River Elk Herd Unit (E107)

Hunt Area	Type	Opens	Closes	Quota	License	Limitations
93	1	Oct. 1	Oct. 31	175	Limited quota	Any elk
		Nov. 1	Nov. 20			Unused Area 93 Type 1 licenses valid for antlerless elk
	4	Oct. 1	Nov. 20	50	Limited quota	Antlerless elk
	6	Oct. 1	Nov. 20	250	Limited quota	Cow or calf
95	1	Oct. 15	Nov. 5	200	Limited quota	Any elk
	2	Oct. 1	Nov. 5	30	Limited quota	Any elk valid within the Green River drainage upstream from the outlet of Lower Green River Lake, including that portion east and south of Mill Creek
	4	Oct. 15	Nov. 5	200	Limited quota	Antlerless elk
	5	Oct. 1	Oct. 14	25	Limited quota	Antlerless elk valid within the Green River drainage upstream from the outlet of Lower Green River Lake, including that portion east and south of Mill Creek
		Oct. 15	Nov. 5			Unused Area 95 Type 5 licenses valid in the entire area
	6	Oct. 15	Nov. 5	75	Limited quota	Cow or calf
96	1	Oct. 15	Oct. 31	200	Limited quota	Any elk
		Oct. 1	Oct. 31			Unused Area 96 Type 1 licenses valid for antlerless elk
	4	Nov. 1	Nov. 20	30	Limited quota	Any elk
		Oct. 1	Nov. 20			Unused Area 96 Type 4 licenses; valid west of the elk fence and
		Nov. 21	Dec. 31			

						south of the New Fork Lake Road
	6	Oct. 1	Nov. 20	200	Limited quota	Cow or calf
Archery Seasons						
93, 95, 96		Sept. 1	Sept. 30			Refer to Section 3

Summary of Proposed Changes in License Numbers

Area	Type	Changes from 2013
96	4	-20
EL107 Totals	4	-20

Management Evaluation

Current Mid-Winter Trend Count Management Objective: 2,500

Management Strategy: Recreational

2013 Trend Count: 2,787

Most Recent 3-year Running Average Trend Count: 2,692

The Green River Herd Unit encompasses approximately 837 square miles of occupied elk habitat, almost entirely within Sublette County. Hunt Area 93 (Waterdog Lakes), Area 95 (Green River), and Area 96 (New Fork) make up the Green River Herd Unit. This herd unit is managed under a mid-winter trend objective of 2,500 ($\pm 20\%$) with a herd estimate derived from 3-year trend count average on feedgrounds and native range combined. This herd is managed under “recreational” management, with a management objective for a bull: 100 cow ratio of 15 to 29 bulls:100 cows.

Herd Unit Issues

Managers believe a very high proportion (>90 %) of elk are typically counted in this herd unit and are located on feedgrounds during the winter. This is an extremely “leaky” herd unit and as a result, a population model has not been successfully developed. Large carnivores (wolves and grizzly bears) have reduced hunter participation in the northern portion of this herd unit, and are likely impacting elk recruitment/survival. Lack of public access on private lands in Area 93 is limiting harvest and compromising harvest goals, primarily on the female segment of this herd.

Weather

Three elk feedgrounds (Green River Lakes, Black Butte, and Soda Lake) are located within this herd unit to winter animals that otherwise would not be able survive the harsh winter conditions. Heavy snow loads typically make most native forage unavailable on most winters. Snow conditions were below normal this past winter (2013-14) until February when heavy snow accumulations occurred. Deep snow and a snow water equivalent of 160 percent of normal persisted well into late April.

Habitat

Roughly 43 square miles of native winter range have been identified, which is mainly located in the upper Green River drainage near Pinyon Ridge and Osborn Mountain that winters approximately 100-200 elk in recent years. Since over 90% of the elk rely on supplemental feeding (feedgrounds) within this herd unit, winter and other seasonal habitats is not considered to be limiting herd dynamics.

Field Data

The 2013 elk trend count was 2,787, showing an increasing trend compared to the previous four years and the highest count in the past 10 years (Table 1). Snow conditions were below normal during the first half of the 2013-14 winter, but snow accumulations significantly increased in February, resulting in good counting conditions on feedgrounds and native winter ranges. Winter conditions, habitat conditions, wolf activity, and timing of classification surveys have resulted in fluctuating trend count data on all three feedgrounds and native winter ranges in past years (Table 1).

Table 1. Trend Count Information for the Upper Green River Elk Herd Unit, 2004-2013.

Location	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>
Green River Lakes F.G	358	556	545	615	591	0	606	532	572	627
Black Butte F.G	723	882	616	815	1072	959	405	751	847	475
Soda Lake F.G.	313	577	856	714	650	0	1417	1144	1103	1492
N.W.R.	<u>525</u>	<u>240</u>	<u>295</u>	<u>220</u>	<u>268</u>	<u>1344</u>	<u>71</u>	<u>155</u>	<u>184</u>	<u>193</u>
Herd Unit	1919	2255	2312	2364	2581	2303	2499	2582	2706	2787

Composition counts during 2013 revealed a bull:cow:calf ratio of 26:100:31. The 2013 bull ratio was slightly lower and the calf ratio was similar compared to the 5-year average of 28:100:30. The 2013 bull ratio is adequate and within management goals for this herd.

Harvest Data

The 2013 harvest report indicated total elk harvest of approximately 450 (250 cow/calves and 200 bulls), similar to the total harvest, but an increase in bull harvest and reduction in cow/calf harvest, compared to 2012. During 2013, 34% of the hunters were successful in harvesting an elk, same as the past 5-year average. Hunter effort increase in 2013 as days/harvest was 25, compared to the 5-year average of 22 days/harvest. License quotas were modified in 2013 in an effort to increase female elk harvest, although not all the available antlerless and cow/calf licenses (Type 4, 5, and 6) were sold in this herd unit.

Population

Since 2012 a mid-winter trend count was utilized to manage this herd unit instead of hand-derived population model estimates. This is an extremely “leaky” herd unit and as a result, a functional computer simulation model has never been developed. The mid-winter trend objective for this herd is 2,500 elk ($\pm 20\%$). The 2011-2013 3-year trend average is 2,692 elk, which is within this herd objective.

Disease

During March and April of 2014 approximately 100 elk, primarily calves, died at or near the Soda Lake feedground due to disease and wolf predation. Investigations concluded the presence of *Fusobacterium 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. Conditions with above average snowfall and above average temperatures create wet conditions causing the bacteria to thrive resulting in infections to elk. Freeze and thaw cycles during these winter conditions cause crusted snow and jagged ice, resulting in a higher than normal abrasions and opportunities for bacterial infections. The weakened condition of elk with this disease also makes animals more susceptible to predation as several wolf documented elk mortalities were documented. The estimated calf loss account for roughly one-third of the calves counted on the Soda Lake feedground this past February.

Management Summary

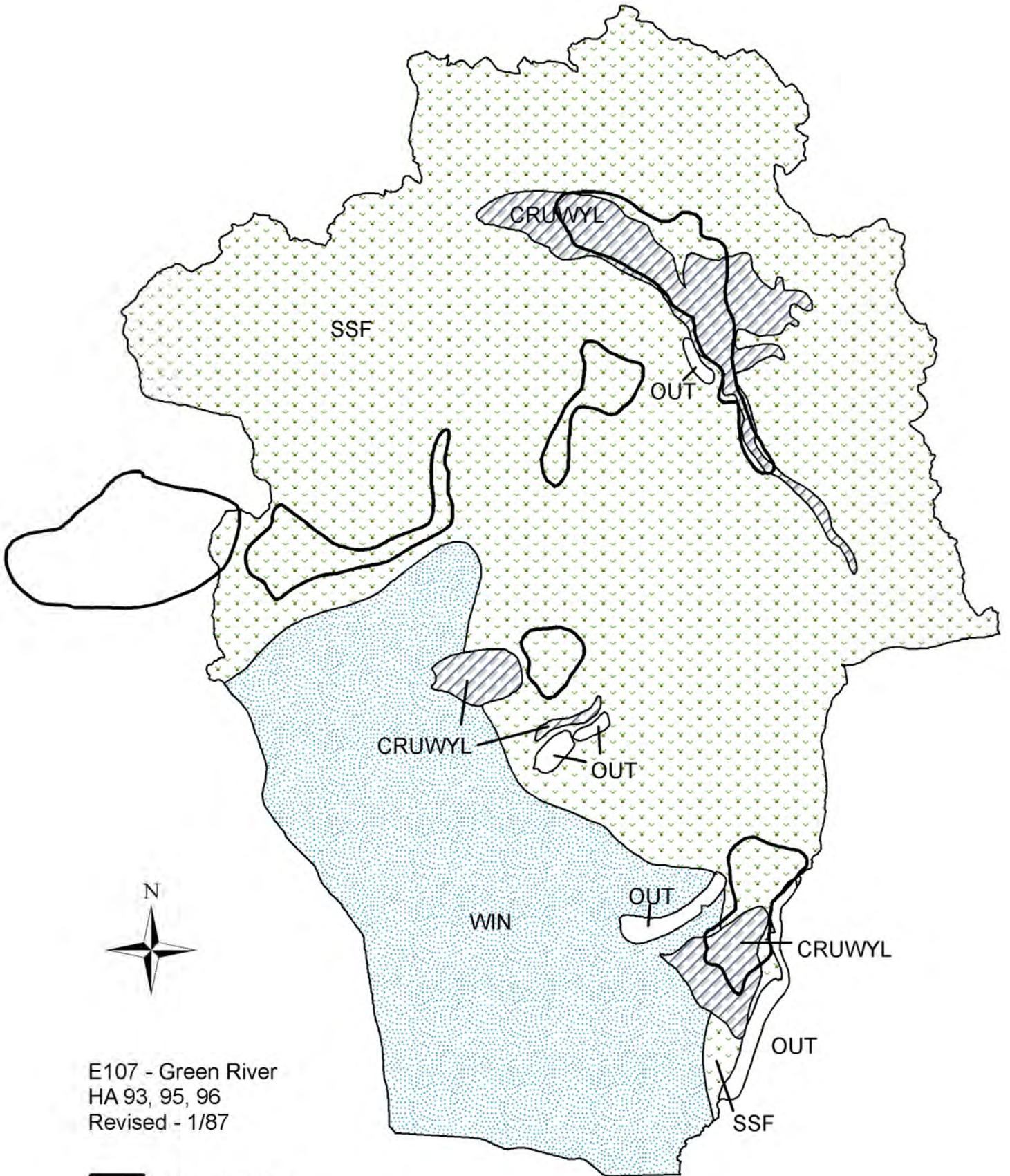
This is an extremely leaky herd unit, and as a result, a functional computer simulation model has not been developed. Overall, the data collected annually in this herd unit has indicated slow population increases since 2003 with the current population (trend count) within management objectives for this herd unit. Hunting seasons in 2004 and 2005 were designed to reduce the overall harvest in Area 96 and to allow the population to increase. The 2006 - 2008 seasons were intended to slightly increase antlerless harvest. The 2009 - 2013 seasons were designed to further increase antlerless harvest which has been somewhat successful at achieving that goal. Hunter participation has declined in portions of this herd unit, specifically the northern portions of Areas 93 and 95, but recently in Area 96 as well. This lack of hunter participation has resulted in only a portion of antlerless and cow/calf licenses being sold. It appears predation from wolves and bears may be compensating for lower hunter/harvest rates in this herd unit, as population trends have only slightly increased in recent years. Disease and wolf related elk losses estimated from the Soda Lake area this past winter and spring equated to roughly 4% of the herd unit (18% of the calves).

The 2014 seasons for the Upper Green River Herd Unit are similar to 2013, which are designed to maintain past bull harvest rates and provide liberal opportunities for female (antlerless) harvest. The same October 1 – November 20 season with no changes in limited quotas licenses (175 Type 1 and 300 Type 4 & 6) will be available in Area 93.

In Area 95, the same season length (October 15 – November 5) and limited quota licenses (200 Type 1, 30 Type 2, 200 Type 4, 25 Type 5, and 75 Type 6) will remain the same in 2014.

The 2014 General season in Area 96 will remain same as in 2013 with a October 15 – 31 “any” elk season. License quotas and season length (October 1 to November 20) will remain the same for Type 1 (n=200) and Type 6 (n=200) compared to 2013. The Type 4 (antlerless elk) quota will be reduced to 30 licenses (reduction of 20) with the same October 1 – November 20 season as other limited quota licenses for this Area. These Type 4 licenses will then be valid in that portion of Area 96 west of the elk fence and south of New Fork Lake Road from November 21 – December 31 to address damage and livestock co-mingling on private lands.

A projected harvest of 500 elk (200 bulls, 250 cows, and 50 calves) for 2014 should result in a post season trend count of approximately 2,700 elk.



E107 - Green River
 HA 93, 95, 96
 Revised - 1/87

 Parturition Area

2013 - JCR Evaluation Form

SPECIES: Elk
 HERD: EL108 - PINEDALE
 HUNT AREAS: 97-98

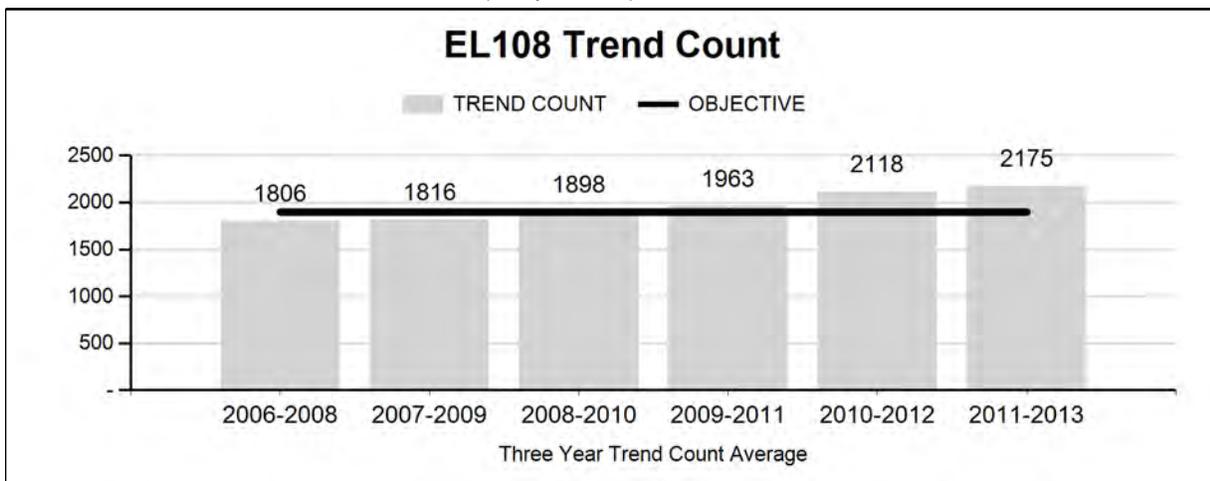
PERIOD: 6/1/2013 - 5/31/2014
 PREPARED BY: DEAN CLAUSE

	<u>2008 - 2012 Average</u>	<u>2013</u>	<u>2014 Proposed</u>
Trend Count:	2,017	2,133	2,000
Harvest:	395	696	550
Hunters:	1,204	1,568	1,500
Hunter Success:	33%	44%	37%
Active Licenses:	1,225	1,675	1,650
Active License Percentage:	32%	42%	33%
Recreation Days:	7,325	11,290	9,000
Days Per Animal:	18.5	16.2	16.4
Males per 100 Females:	23	24	
Juveniles per 100 Females	28	30	

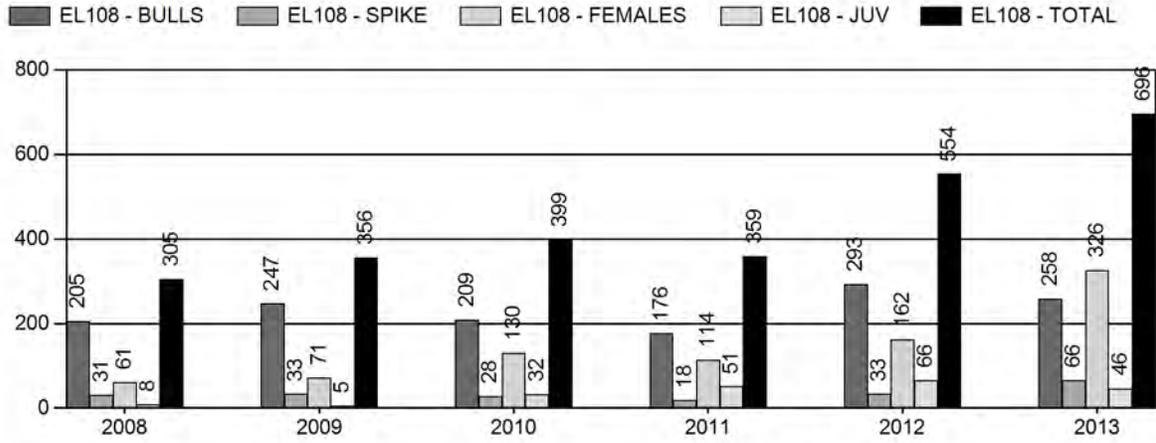
Trend Based Objective ($\pm 20\%$) 1,900 (1520 - 2280)
 Management Strategy: Recreational
 Percent population is above (+) or (-) objective: 12%
 Number of years population has been + or - objective in recent trend: 0

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

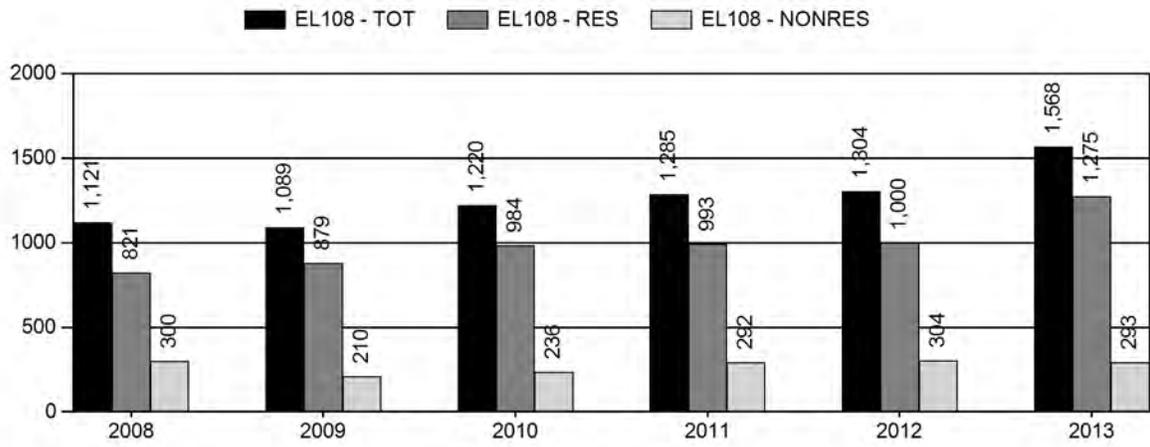
	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	0%	0%
Males ≥ 1 year old:	0%	0%
Juveniles (< 1 year old):	0%	0%



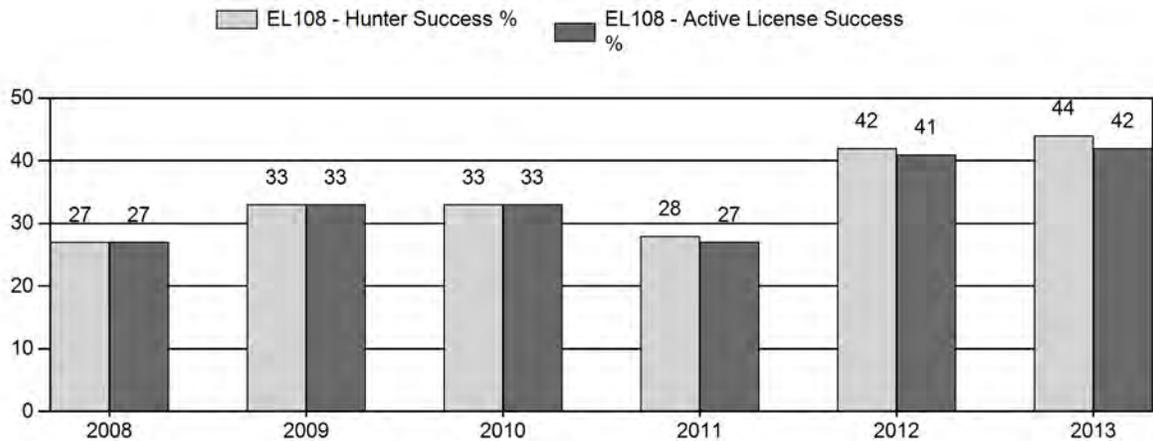
Harvest



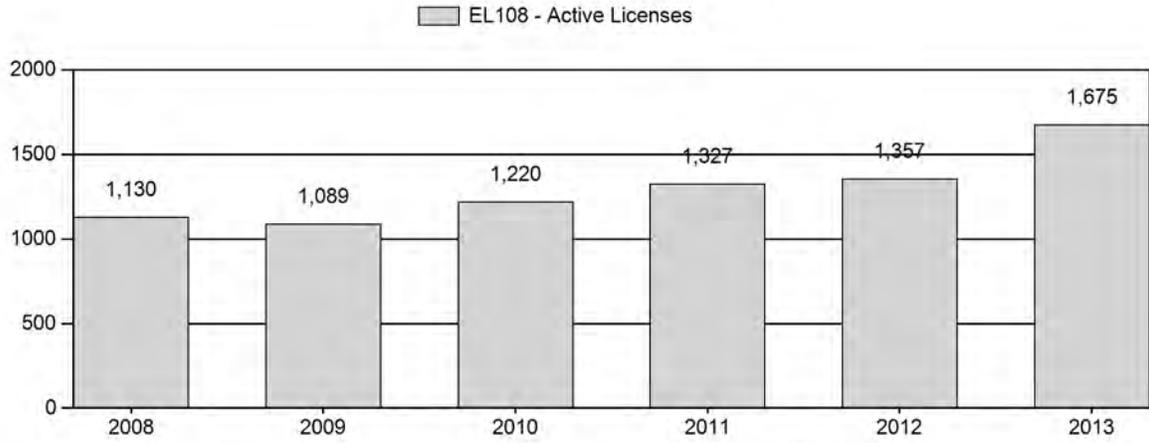
Number of Hunters



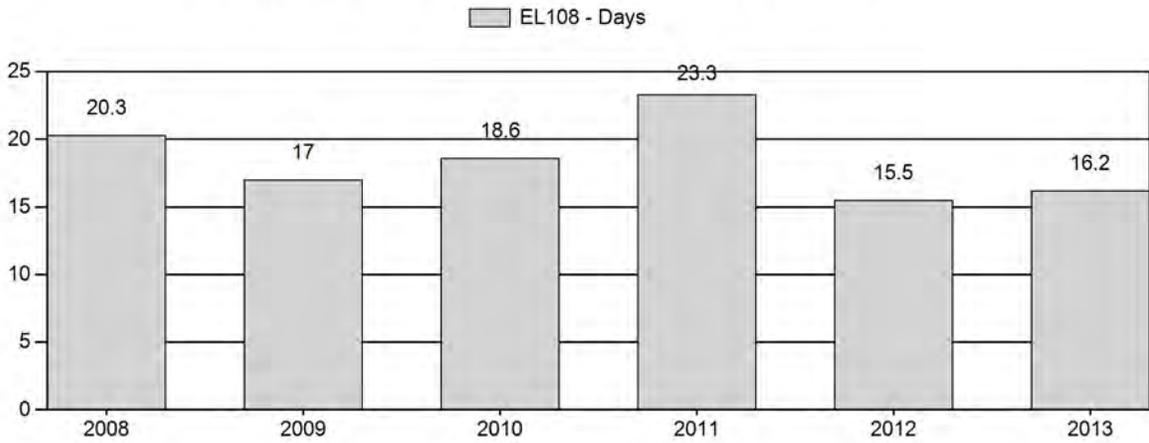
Harvest Success



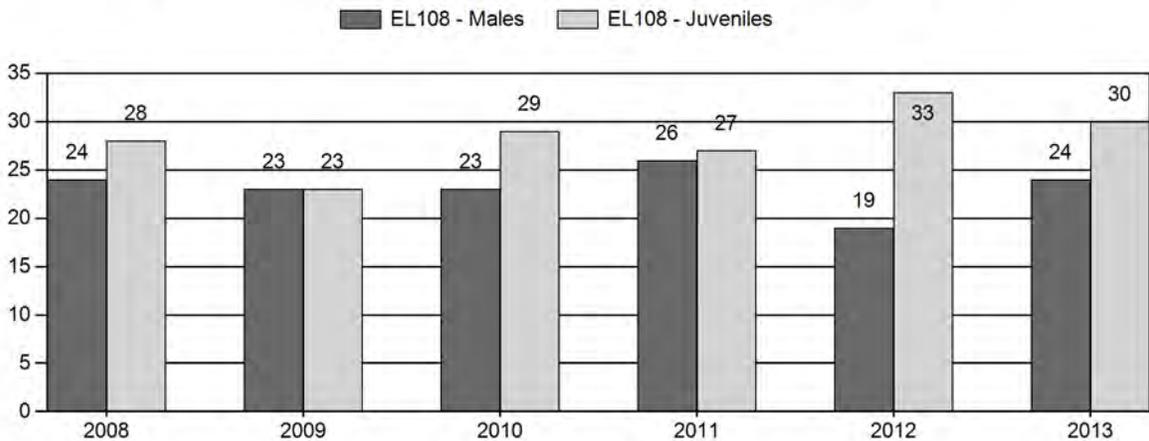
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Elk Herd EL108 - PINEDALE

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot CIs	Cls Obj	Males to 100 Females			Young to			
		Ylg	Adult	Total	%	Total	%	Total	%			Yng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	2,006	102	193	295	16%	1,239	66%	351	19%	1,885	303	8	16	24	± 0	28	± 0	23
2009	1,980	90	187	277	16%	1,203	69%	273	16%	1,753	240	7	16	23	± 0	23	± 0	18
2010	2,000	102	186	288	15%	1,253	66%	366	19%	1,907	315	8	15	23	± 0	29	± 0	24
2011	2,168	144	219	363	17%	1,401	66%	374	17%	2,138	296	10	16	26	± 0	27	± 0	21
2012	0	120	149	269	13%	1,404	66%	457	21%	2,130	368	9	11	19	± 0	33	± 0	27
2013	0	158	174	332	16%	1,383	65%	418	20%	2,133	334	11	13	24	± 0	30	± 0	24

2014 Seasons – Pinedale Elk Herd Unit (EL108)

Hunt Area	Type	Opens	Closes	Quota	License	Limitations
97	Gen	Oct. 1	Oct. 15		General	Any elk
		Oct. 16	Nov. 20			Antlerless elk
	1	Sept. 20	Oct. 31	300	Limited quota	Any elk
		Nov. 1	Nov. 20			Unused Area 97 Type 1 licenses valid for antlerless elk
	6	Sept. 20	Nov. 20	125	Limited quota	Cow or calf elk
98	Gen	Oct. 1	Oct. 15		General	Any elk
		Oct. 16	Nov. 20			Antlerless elk
	1	Sept. 20	Oct. 31	350	Limited quota	Any elk
		Nov. 1	Nov. 20			Unused Area 98 Type 1 licenses valid for antlerless elk
	4	Sept. 20	Nov. 20	75	Limited quota	Limited quota; antlerless elk
	6	Sept. 20	Nov. 20	300	Limited quota	Limited quota; cow or calf elk
1,4,6	Nov. 21	Jan. 31			Unused Area 98 Type 1, Type 4, and Type 6 licenses valid for antlerless elk in that portion of Area 98 between the Scab Creek and the East Fork River drainage, excluding Irish Canyon Creek and Muddy Creek Drainages.	
Archery Seasons						
97,98		Sept. 1	Sept. 19			Refer to Section 3

Summary of Changes in License Numbers

Area	Type	Changes from 2013
98	6	+25
EL107 Totals	6	+25

Management Evaluation

Current Mid-Winter Trend Count Management Objective: 1,900

Management Strategy: Recreational

2012 Trend Count: 2133

Most Recent 3-year Running Average Trend Count: 2175

The Pinedale Herd Unit encompasses approximately 2,474 square miles of which only 522 square miles are considered occupied elk habitat. Only a small portion of this herd unit, located on the south end, is located in Sweetwater County, while the majority lies in Sublette County. Hunt Area 97 (Pinedale) and Area 98 (Boulder) make up the Pinedale Herd Unit. This herd unit is managed under a mid-winter trend objective of 1,900 ($\pm 20\%$) with a herd estimate derived from 3-year trend count average on feedgrounds and native range combined. This herd is managed under “recreational” management, with a management objective for bull: 100 cow ratio of 15 to 29.

Herd Unit Issues

Managers believe a very high proportion (>90%) of elk are typically counted in this herd unit and are located on feedgrounds during the winter. This is an extremely “leaky” herd unit and as a result, a population model has not been successfully developed. Well over half of these Forest Service managed lands are designated as Wilderness (Bridger Wilderness) where access is limited to foot or horseback travel. The remaining Forest Service lands outside wilderness have moderate vehicle and trail access. Hunting opportunities for self-guided non-residents is limited in this herd unit because non-residents are required by law to have a licensed guide or outfitter while hunting in designated wilderness areas. Lack of public access on private lands in Area 98 along Scab and Silver Creeks provides a “refuge” for elk, continuing to limit harvest and compromising female elk harvest goals.

Weather

Three elk feedgrounds (Fall Creek, Scab Creek, and Muddy Creek) are located within this herd unit to winter animals that otherwise would not be able survive the harsh winter conditions. Feedgrounds also reduce depredation to stored hay and reduce risk of disease transmission to livestock (primarily brucellosis).

Habitat

Roughly 32 square miles of crucial native winter range have been identified in this herd unit, wintering roughly 100-150 elk in recent years. Since over 90% of the elk rely on supplemental feeding (feedgrounds) within this herd unit, winter and other seasonal habitats are not limiting herd dynamics.

Field Data

The 2013 elk trend count of 2,133 was lower than the 2,253 elk counted in 2012. The 2012 trend count was the highest documented in the past 10 years (Table 1). Snow conditions were below normal during the first half of the 2013-14 winter with heavy snow accumulations in February, resulting in good counting conditions on feedgrounds and native winter range. A higher than normal proportion of elk (12%) than normal were documented on native winter range, due to mild winter conditions prior to aerial counts being conducted. The Halfmoon, Cottonwood Creek, and Silver Creek areas account for the majority of elk counted on native winter range in 2013.

Table 1. Herd Composition Counts in the Pinedale Elk Herd Unit, 2004-2013.

Location	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Fall Creek F.G	438	506	529	494	527	0	554	655	675	660
Scab Creek F.G	825	810	750	776	754	600	780	806	912	727
Muddy Creek F.G.	396	431	383	376	510	422	467	557	522	499
<u>N.W.R.</u>	<u>61</u>	<u>111</u>	<u>96</u>	<u>68</u>	<u>154</u>	<u>766</u>	<u>161</u>	<u>120</u>	<u>144</u>	<u>247</u>
Herd Unit Total	1720	1858	1758	1714	1944	1788	1962	2138	2253	2133

Herd composition counts in 2013 documented a bull:cow:calf ratio of 24:100:30. Compared to 2012, the bull ratio increased while the calf ratio decreased in 2013. The previous 5-year average bull:cow:calf ratio was 23:100:28, similar to that observed in 2013.

Harvest Data

With the termination of the Test and Removal Pilot Project after the 2009-10 winter, hunting seasons were modified in 2010 to increase female harvest opportunities by adding Type 4 and Type 6 licenses, and allowing general license hunters to harvest “any” elk instead of “antlered” elk, which doubled female harvest in 2010. During 2011, the combination of mild temperatures and limited precipitation contributed to the poor harvest, as seasons were designed to increase female harvest. In 2012 seasons were designed to increase female harvest opportunities, while 2013 seasons further increased female harvest opportunities while reducing bull harvest opportunities. The 2013 harvest survey reported approximately 700 total elk taken, a significant increase from approximately 350 in 2011 and 550 in 2012. The increased harvest in 2013 is primarily due to increased cow/calf harvest by 145 cows/calves. During the 2013 hunting season it took an average of 16 days to kill an elk with a 42% success rate being reported, similar to 2012.

Population

Starting in 2012, a mid-winter trend count will be utilized to manage this herd unit instead a hand-derived population model estimates. This is a somewhat “leaky” herd unit and as a result, a functional computer simulation model has not been developed, which may also be attributed to

high bull harvest annually reported in this herd unit. The mid-winter trend objective for this herd is 1,900 elk ($\pm 20\%$). The 2011-2013 3-year trend average is 2,175 elk, which is within this herd objective.

Management Summary

Trend counts in this herd unit indicate elk declined from 2004-2007, recovered during 2008, stabilized somewhat in 2009 and 2010, increased in 2011 and 2012, and stabilized in 2013. Recent counts indicate bull:cow:calf ratios are adequate, although the highest bull harvest reported during the last 10 years occurred in 2012 and 2013. The bull harvest annually reported for this herd unit is questionable as managers are confident $>90\%$ elk are counted (classified) annually and bull harvest rates range from 50%-60% on most years. Documented elk numbers in 2013 are currently within the management objectives, but are near the upper threshold. Maintaining similar female harvest rates as those reported in 2013 is needed to stabilize and decrease elk numbers in this herd unit.

The harvest objectives for the 2014 seasons are similar to 2013, designed to increase female harvest while reducing opportunities for bull harvest. The season closing date for antlerless harvest will be extended to November 20 (+5 days) in both Area 97 and 98. Limited quota, Type 1 "any" elk licenses in Area 97 will remain at 300 licenses, although the demand for these licenses has been below this level in recent years attributed to limited harvest opportunities outside the Bridger Wilderness. The season length for Type 1 licenses will be Sept. 20 – Nov. 20, valid for antlerless elk from Nov 1. – Nov. 20. The Type 6 licenses will remain at 125, valid from Sept. 20 – Nov. 20 for antlerless elk.

In Area 98, the quota for Type 1 licenses ($n=350$) with a Sept. 20 – Nov. 20 season, valid for antlerless elk from Nov 1. – Nov. 20. Limited quota, Type 4 licenses will remain at 75 and Type 6 licenses will increase to 300(+25) with a Sept. 20 – Nov. 20 season. Similar to past years, further antlerless harvest opportunities will be provided for unused limited quota licenses (Type 1, 4, and 6) from Nov. 16 – Jan 31 between Scab Creek and the East Fork River to address damage and cattle co-mingling issues. The opportunity to harvest bulls from Jan. 16 – Jan. 31 on those lands enrolled in the Chimney Butte HMA was eliminated for 2014.

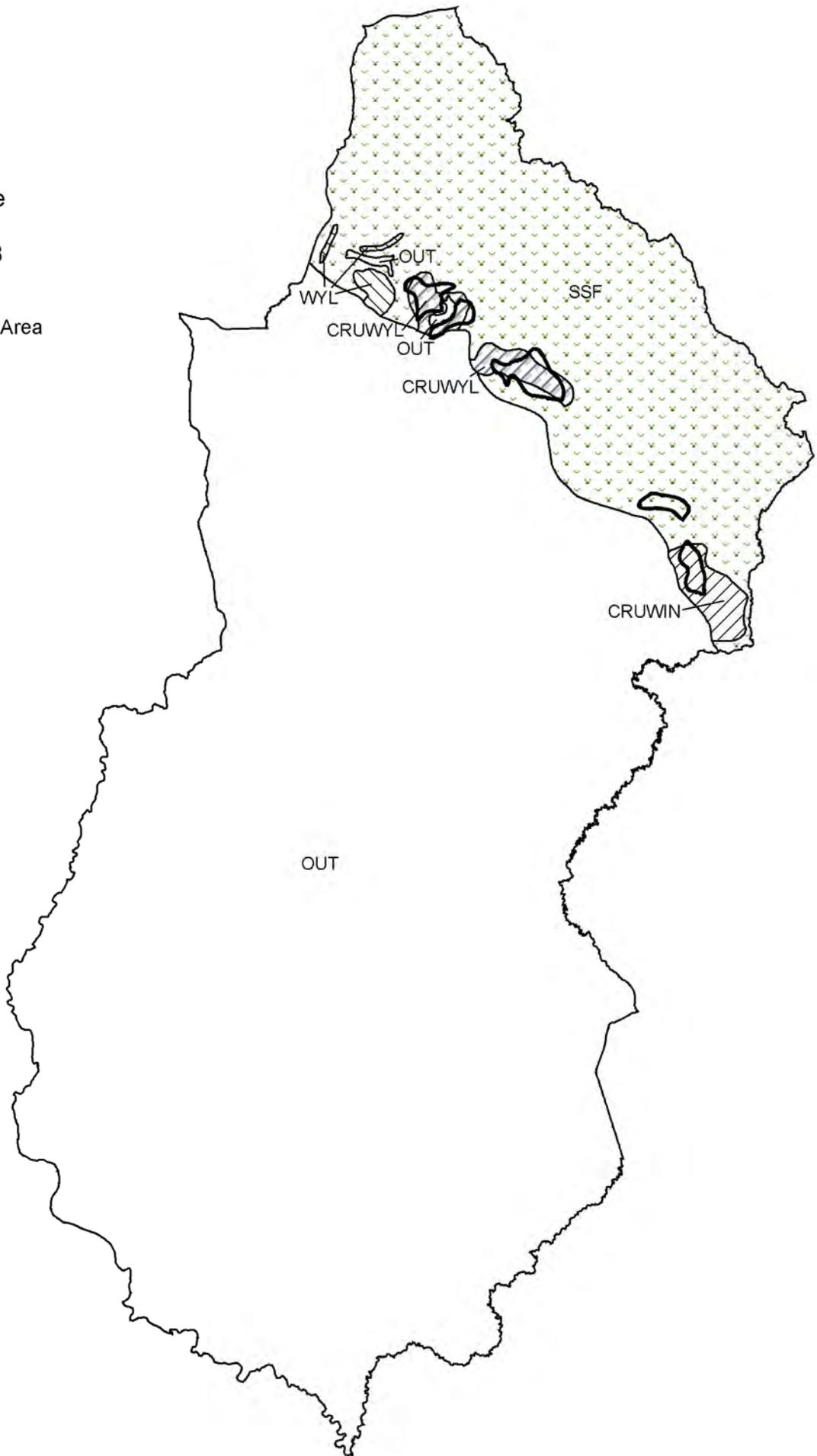
General license seasons in both Area 97 and 98 will remain the same in 2014. From Oct. 1 – Oct. 15 General licenses will be valid for "any" elk. From Oct. 16 – Nov. 20 General licenses will be valid for "antlerless" elk

The hunting seasons for 2014 should result in the harvest of approximately 250 bulls, 250 cows, and 50 calves for a total harvest of 550 elk. This season should result in a postseason 2014 trend count estimate of approximately 2,000 elk.



E108 - Pinedale
HA 97, 98
Revised - 12/88

 Parturition Area



2013 - JCR Evaluation Form

SPECIES: Moose

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

HERD: MO105 - SUBLETTE

HUNT AREAS: 3-5, 10, 20-25

PREPARED BY: DEAN CLAUSE

	<u>2008 - 2012 Average</u>	<u>2013</u>	<u>2014 Proposed</u>
Trend Count:	1,193	1,400	1,400
Harvest:	245	208	205
Hunters:	277	228	230
Hunter Success:	88%	91%	89%
Active Licenses:	277	91%	230
Active License Percentage:	88%	91%	89%
Recreation Days:	2,016	1,694	1,650
Days Per Animal:	8.2	8.1	8.0
Males per 100 Females:	63	65	
Juveniles per 100 Females	40	42	

Trend Based Objective (± 20%) 1,500 (1200 - 1800)

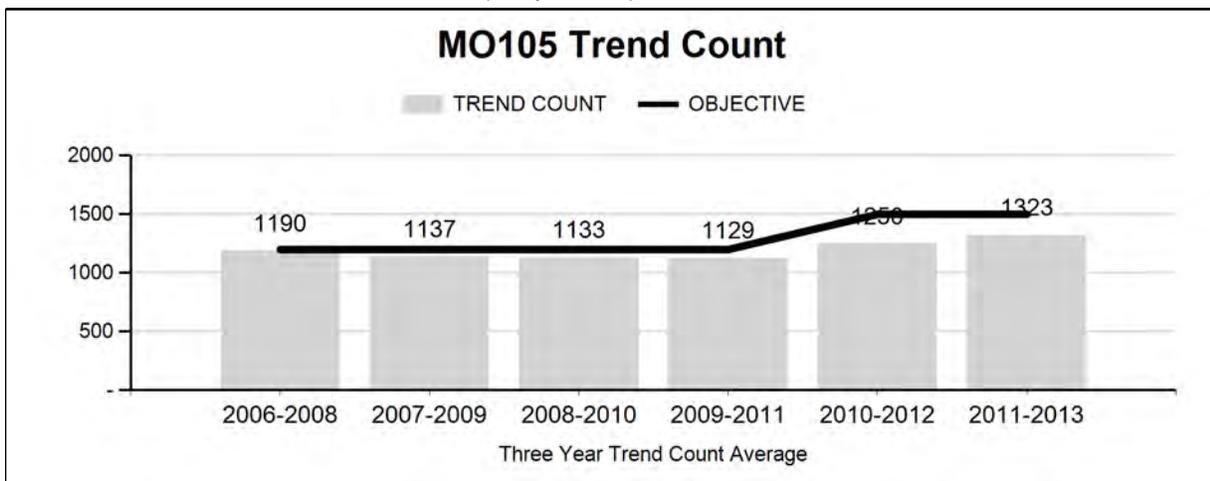
Management Strategy: Special

Percent population is above (+) or (-) objective: -6.7%

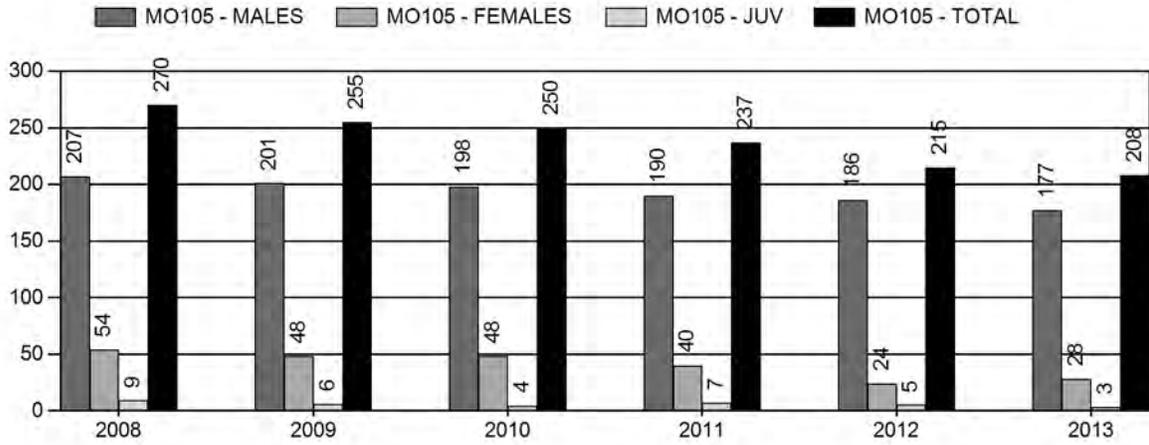
Number of years population has been + or - objective in recent trend: 0

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

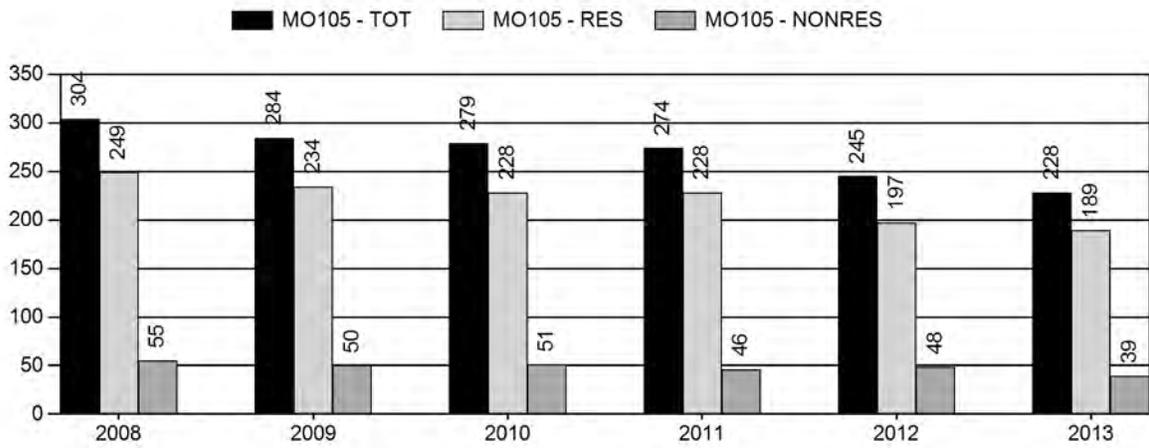
	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	0%	0%
Males ≥ 1 year old:	0%	0%
Juveniles (< 1 year old):	0%	0%



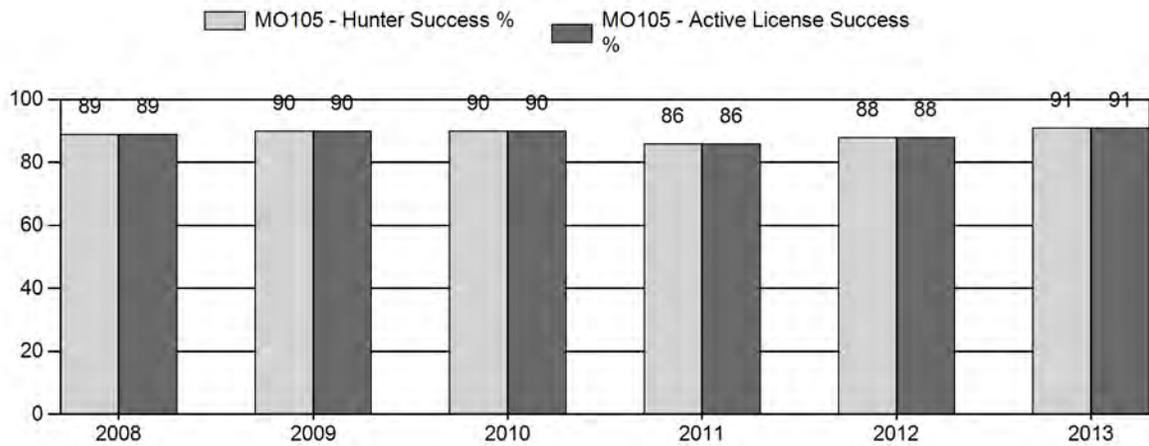
Harvest



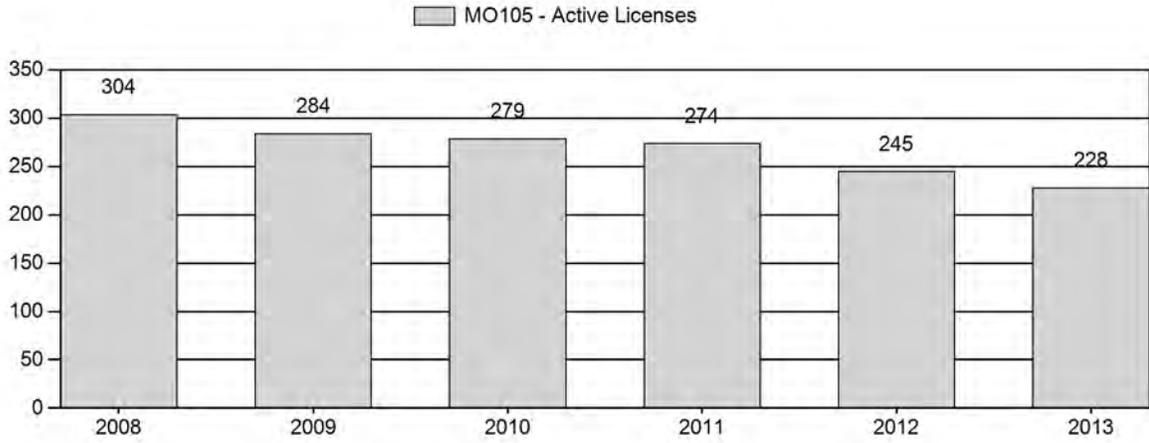
Number of Hunters



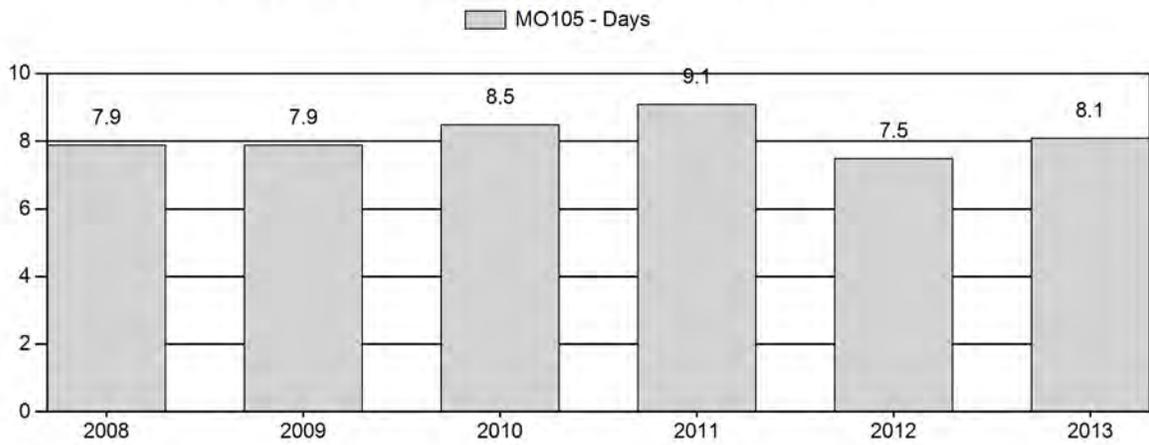
Harvest Success



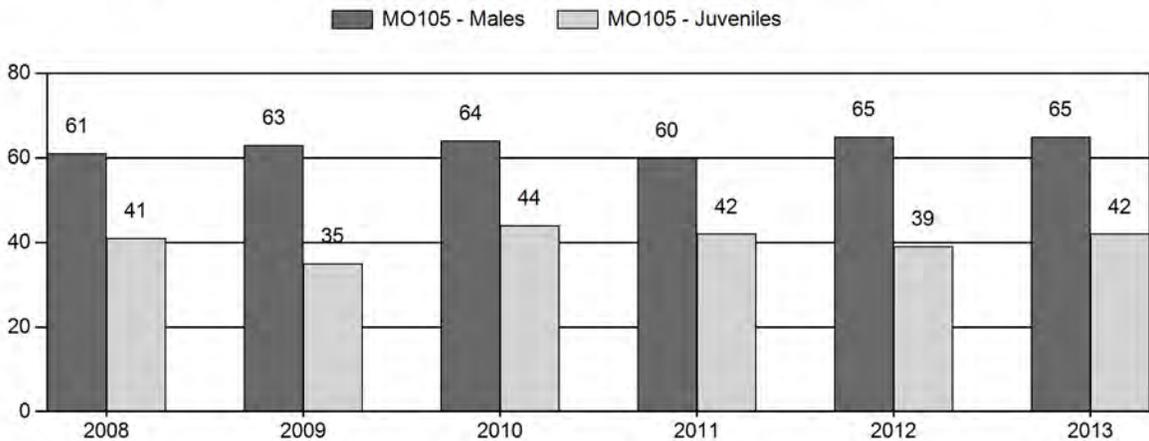
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Moose Herd MO105 - SUBLETTE

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot CIs	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	4,768	0	383	383	30%	629	50%	255	20%	1,267	980	0	61	61	± 4	41	± 3	25
2009	4,701	0	295	295	32%	465	50%	163	18%	923	1,041	0	63	63	± 0	35	± 0	21
2010	4,908	0	361	361	31%	563	48%	246	21%	1,170	1,111	0	64	64	± 0	44	± 0	27
2011	5,000	0	377	377	30%	625	49%	262	21%	1,264	1,016	0	60	60	± 4	42	± 3	26
2012	0	0	413	413	32%	632	49%	247	19%	1,292	1,118	0	65	65	± 0	39	± 0	24
2013	0	0	435	436	31%	669	48%	282	20%	1,387	909	0	65	65	± 0	42	± 0	26

2014 Seasons – Sublette Moose Herd Unit (MO105)

Hunt Area	Type	Opens	Closes	Quota	License	Limitations
3	1	Sept. 20	Oct. 31	10	Limited quota	Antlered moose
4	1	Sept. 20	Oct. 31	10	Limited quota	Antlered moose
	4	Sept. 20	Oct. 31	5	Limited quota	Antlerless moose, except cow moose with calf at side
5	1	Oct. 1	Oct. 31	30	Limited quota	Antlered moose
	4	Oct. 1	Oct. 31	15	Limited quota	Antlerless moose, except cow moose with calf at side
10	1	Sept. 15	Oct. 31	15	Limited quota	Antlered moose
20	1	Sept. 15	Oct. 31	15	Limited quota	Antlered moose
21	1	Sept. 15	Oct. 31	5	Limited quota	Antlered moose
22	1	Oct. 1	Oct. 31	15	Limited quota	Antlered moose
23	1	Sept. 15	Oct. 31	25	Limited quota	Antlered moose
24	1	Sept. 15	Oct. 31	25	Limited quota	Antlered moose
	4	Sept. 15	Oct. 31	5	Limited quota	Antlerless moose, except cow moose with calf at side
25	1	Oct. 1	Oct. 31	45	Limited quota	Antlered moose
	4	Oct. 1	Oct. 31	15	Limited quota	Antlerless moose, except cow moose with calf at side
Archery Seasons						
3,4		Sept. 1	Sept. 19		Limited quota	Refer to Section 3
5,22, ,25		Sept. 1	Sept. 30		Limited quota	Refer to Section 3
10,20,21, 23, 24		Sept. 1	Sept. 14		Limited quota	Refer to Section 3

Summary of Changes in License Numbers

Hunt Area	License Type	Quota Changes from 2013
20	1	-5
MO105 Totals	1	-5

Management Evaluation

Current Mid-Winter Trend Count Management Objective: 1,500

Management Strategy: Special

2013 Trend Count: 1,400

Most Recent 3-year Running Average Trend Count: 1,323

The Sublette Moose Herd Unit encompasses approximately 3,306 square miles of occupied moose habitat that lies within portions of Lincoln, Sublette, and Teton Counties. The Wyoming Range and Salt River Range Mountains, along with a portion of the Wind River and Gros Ventre Mountains lie within this herd unit. A total of 10 Hunt Areas (Areas 3, 4, 5, 10, 20, 21, 22, 23, 24, & 25) make up the Sublette Herd Unit. A mid-winter trend objective of 1,500 ($\pm 20\%$) moose is the management objective for this herd unit. This herd unit is also under a “special” management strategy to maintain an average harvest age of 4 for bulls as a measure to maintain “trophy” harvest opportunities.

Herd Unit Issues

Undetermined moose deaths have been documented within this herd unit during the past years. The significance of these spring mortalities are currently unknown, and it appears other factors besides hunter harvest is slowing population growth. A study is currently being conducted within a portion of this herd unit to document moose demographics, body condition, and survival rates to help managers better understand issues and problems within this moose population. Preliminary findings from this study have indicated lower than expected adult female survival, fluctuating pregnancy rates, and decent calf survival rates. Factors such as habitat conditions, disease, predation, etc. may be attributing to limited population growth in this herd and hopefully this study will identify problems and issues associated with this moose population.

Weather

Although winter snow accumulations appear to influence winter trend count data as observations of moose at lower elevations increase during winters with above average snow loads, little is known of other effects of weather on this moose herd. Recent weather trends have been drier and warmer, with sporadic periods of harsh winter conditions. More specific information can be accessed from the following websites:

<http://www.ncdc.noaa.gov/temp-and-precip/time-series/>

<http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html>

Habitat

The main plant community associations in this herd unit are willow, sagebrush, aspen, conifer, and alpine communities from lower to higher elevations (6,500 to 12,500 feet). Moose in this herd unit can be found on both private and public land managed by the U.S. Forest Service and Bureau of Land Management (BLM) during summer and fall periods. During the winter months most moose migrate to lower elevation willow bottom or aspen dominated habitats, typically associated with private lands. Roughly 700 square miles of native winter range have been identified in this herd unit, which encompasses all types of land ownership (private, public, and state trust land).

Habitat assessments were conducted in 2009-2011 within portions of this moose herd unit. Specific information about this habitat assessment along with other ongoing habitat project information can be found at the following source: Please see the [2013 Annual Report Strategic Habitat Plan Accomplishments, Jackson and Pinedale Region sections](#) located at either the Jackson or Pinedale Game & Fish Regional Office for detailed summaries of habitat work within the Sublette Herd Unit.

Research

A study was initiated during February of 2011 to evaluate demography, nutrition, and habitat use within a portion of the Sublette Moose Herd. Although this results of this study is not final, a summary report is provided in Appendix A.

Field Data

The number of moose documented during 2013 postseason classification surveys increased compared to 2012, a similar trend since 2010. Snow conditions were below normal during the first half of the 2013-2014 winter, with heavy snow accumulations during February 2014. High concentrations of moose at lower elevations (Areas 4 and 25) and fewer moose at higher elevation habitats are typically observed during winter surveys (Table 1). Trend counts are influenced by winter snow depths, as an even higher proportion of moose concentrate at lower, usually willow bottom, habitats on heavy snow years, and vacate higher elevation forested habitats where moose observability is poor. Budgeted survey time limits the coverage of forested habitats, concentrating survey efforts to lower elevation habitats where moose congregate in more open terrain where observability is good. Overall, trend counts have slightly increased annually since 2010, even with lower than normal snow levels in 2011 and 2012, indicating that some population growth has occurred in this herd.

Postseason classification surveys for 2013 produced a bull:100 cow ratio of 65:100, similar to the previous 5-year average of 63:100. The 2013 calf: 100 cow ratio of 42:100 was slightly higher than the 5-year average of 40:100.

Table 1. Trend counts by Hunt Area for the Sublette Moose Herd Unit, 2004-2013.

<u>Hunt Area</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>
3	17	29	24	19	11	56	18	38	21	24
4	193	247	248	244	271	212	261	320	319	346
5	119	93	75	76	106	48	100	44	82	79
10	10	18	52	11	7	13	10	8	4	0
20	29	61	13	39	19	10	16	28	13	32
21	4	4	12	10	22	4	30	23	18	11
22	18	11	6	17	28	30	23	27	49	47
23	51	75	60	50	28	60	46	26	52	55
24	0	0	0	0	0	0	0	0	0	0
<u>25</u>	<u>755</u>	<u>749</u>	<u>606</u>	<u>729</u>	<u>788</u>	<u>503</u>	<u>679</u>	<u>754</u>	<u>742</u>	<u>806</u>
Total	1196	1287	1096	1195	1280	936	1183	1268	1300	1400

Harvest Data

A total harvest of approximately 210 moose (180 bulls and 30 cows/calves) was reported in 2013, slightly lower than the 2012 harvest. Harvest has continued to decline slightly during the years, as managers have continued to make slight reduction in licenses. The total number of licenses issued declined from 630 in 2002 to 240 in 2013, a total decrease of 390 (62%). These reductions in license types since 2002 equates to declines of 83% (n=190) in antlerless and 50% (n=200) in antlered moose licenses. Compared to the previous 5-year averages, hunter success was slightly higher at 91% in 2013, while hunter effort remained similar at 8.1 days per animal harvested.

A total of 121 teeth representing approximately 58% of the reported 2013 harvest were aged using cementum annuli analysis. The 2013 tooth age results from the WGFD lab showed an average age of 3.9 (derived from 59% of reported harvest) for bulls and 3.7 (derived from 57% of reported

harvest) for cows. Average age of harvest remained similar for bulls and increased for cows compared to the 2011 (Figure 1). The 10-year average (2003-2012) age of harvest for this herd unit is approximately 4.0 years for both bulls and cows (Figure 1).

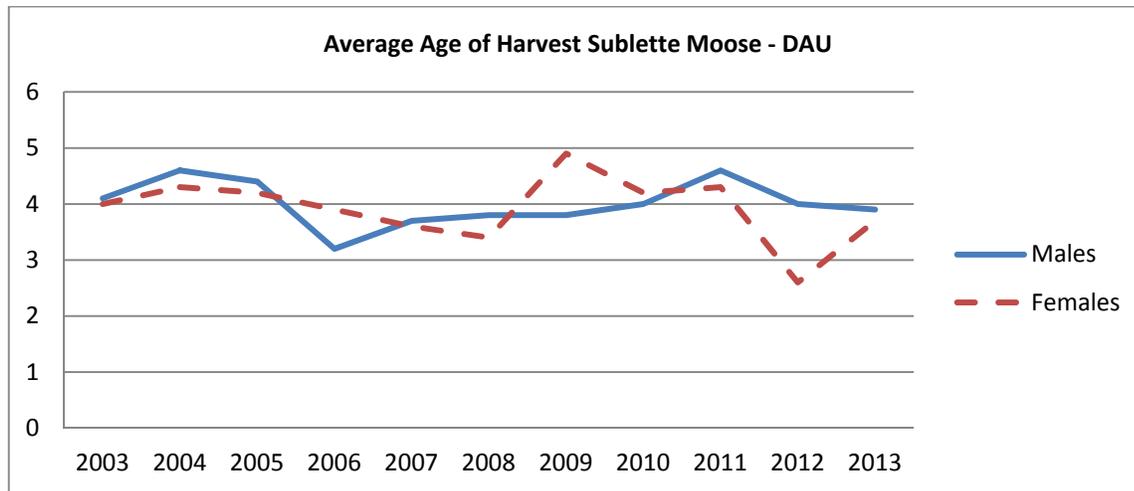


Figure 1. Average age of harvested male and female moose, Sublette Herd Unit, 2003-2013.

Population

Starting in 2013, a mid-winter trend count was approved as the management objective for this herd unit instead of past population modeling efforts. The mid-winter trend objective for this herd is 1,500 moose ($\pm 20\%$), which is higher than the past 10-year average around 1,200 moose. The 2013 mid-winter trend count was 1400 moose and the 3-year average (2011-2013) trend average was 1323 moose.

Past population modeling efforts for this herd have typically produced estimates higher, usually ~75% higher, than what annual trend counts document. Maintaining comparable classification survey efforts (flight time) compared to past years will provide managers a reliable data set that will reflect population trends in this herd unit. These mid-winter trend counts do not reflect the actual moose population, as not all areas with wintering moose are surveyed and not all moose are observed in those areas that are surveyed.

Management Summary

Data for this herd unit suggest this postseason moose population was declining in the late 1990’s, stabilized in 2004 and 2005, then began slowly increasing through 2013. During 2013, reproduction rates remain good at 42 calves:100 cows, male ratios remained relatively stable at 65 bulls:100cows, trend counts increased, and harvest success remained high at 91%. In addition, average age of harvested males is adequate and maintaining good bull quality throughout the herd unit. Trend data suggest the population is slowly increasing and hunter satisfaction appears to be good.

One license change, reduction of Type 1 licenses (-5) in Area 20, was made for the 2014 season. A total of 195 Type 1 (antlered) and 40 Type 4 (antlerless) licenses are available for 2014. Opening dates were changed to September 15 in Areas 10, 20, 21, and 24. Harvest for 2014 is estimated at 175 bulls and 30 cows/calves for a total harvest of 205 moose. Given average reproduction and survival, this harvest should result in a 2014 mid-winter trend count near 1,400 – 1,450 moose.

Appendix A

Demography, nutrition, and habitat use of the Sublette moose herd

Brendan Oates^{1,2}, Gary Fralick³, Jacob R. Goheen¹, Matthew J. Kauffman^{1,2}, Kevin L. Monteith², Scott Smith³

¹University of Wyoming, Department of Zoology and Physiology

²Wyoming Cooperative Fish and Wildlife Research Unit

³Wyoming Game and Fish Department

The Sublette moose herd represents the largest and most economically-important moose population in Wyoming. In 2010, we initiated our study at the behest of the Wyoming Governor's office to provide information on 1) the survival and fecundity of cow moose; 2) rates of juvenile recruitment; and 3) habitat selection and migration between winter and summer ranges. The impetus for this initiative was to provide baseline information prior to potential energy development by Plains Exploration and Production Company (PXP) in the Hoback Basin. In Fall 2012, a collaboration of sportsmen and sportswomen, conservationists, outdoor enthusiasts, and Wyoming government officials organized to offer a buyout of the leases owned by PXP in the Hoback Basin. The Trust For Public Land agreed to broker the \$8.75 million deal with PXP, which was met in December. While the potential for energy development in the Hoback Basin has subsided, there are still natural gas leases (44,720 acres; i.e., the 44-7 leasing zone) that fall within our study area near the creeks of South Beaver, North Horse, and Cottonwood. Although moose are relatively abundant in the 44-7 leasing zone, very little is known about their demography or habitat use. Thus, it is crucial to continue our study where existing leases still are active. Further, our data provide information on the interacting influences of nutritional condition, disease, and predation for this important moose herd, which are critical but poorly-understood components of demography.

February 13th through the 15th 2012, 48 adult females were captured by Native Range Capture Services using net guns. 18 of these animals were recaptured from 2011, as well as 30 additional individuals. We used the occurrence of pregnancy-specific protein B, assessed from blood samples, to estimate pregnancy rates of captured females (n=48). Pregnancy rates (2011: 46% n=23; 2012: 69% n=48) were low for moose. Using ultrasonography, each female (n=48) was measured for percent body fat, which is the most reliable index of nutritional condition. These measurements were then related the probability of survival, pregnancy, and presence of *Elaeophora schneideri*, which were all strongly correlated to nutritional condition (see Figure 1 on page 2).

Pregnant females are located biannually via helicopter (once in June and then again in July) to assess parturition and neonate survival. Neonate survival was 64% ± 0.13 SE (n=11) in 2011 and 81% ± 0.07 SE (n=32) in 2012, both of which are relatively high rates compared to other moose populations in North America. Currently, we are collecting movement data of collared moose as they die (collar retrieved from field) or once collar-release mechanism activates on April 1, 2014. To date, we have collected 14 GPS collars and downloaded their movement data. Analysis of movement and habitat use will begin in Spring 2013.

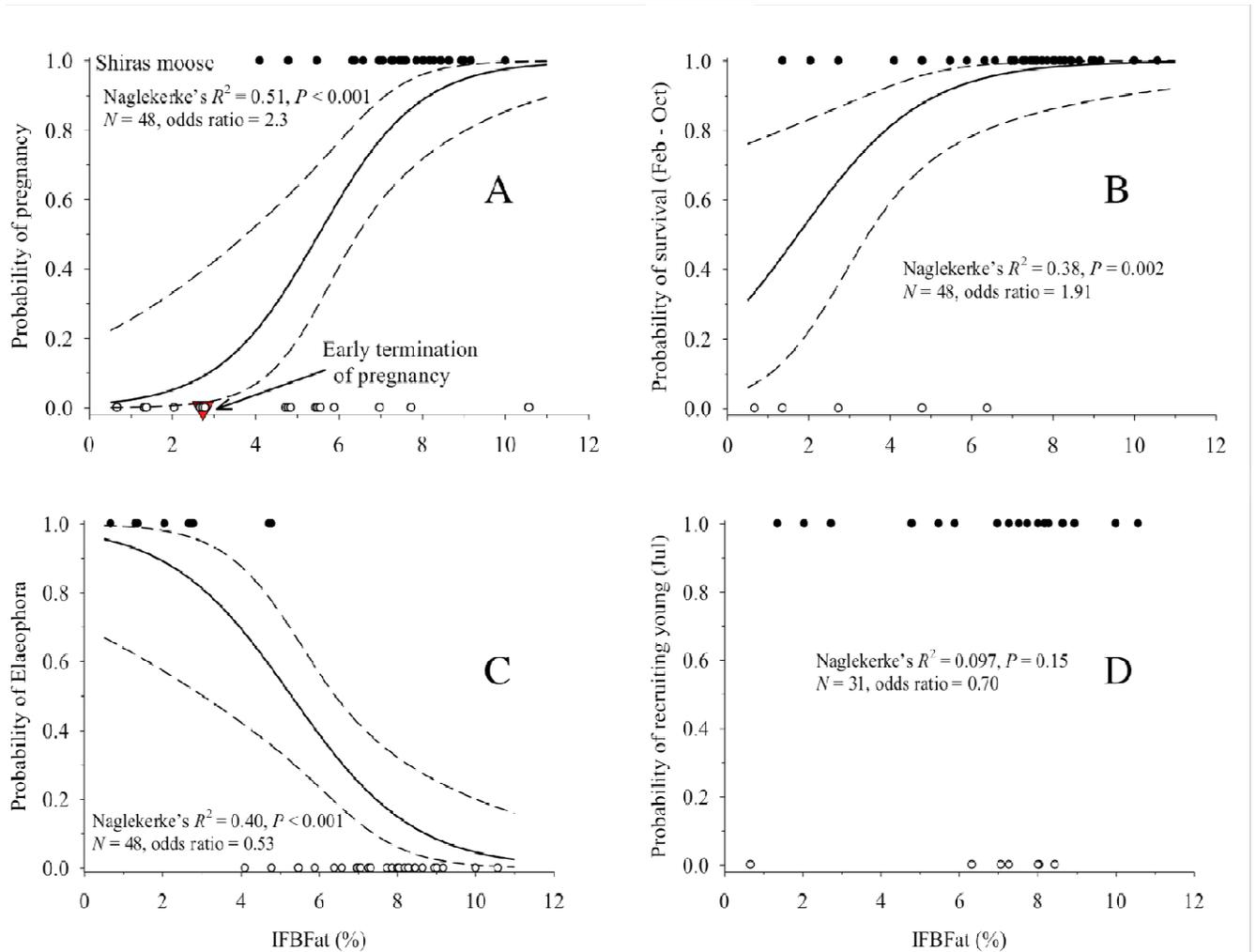
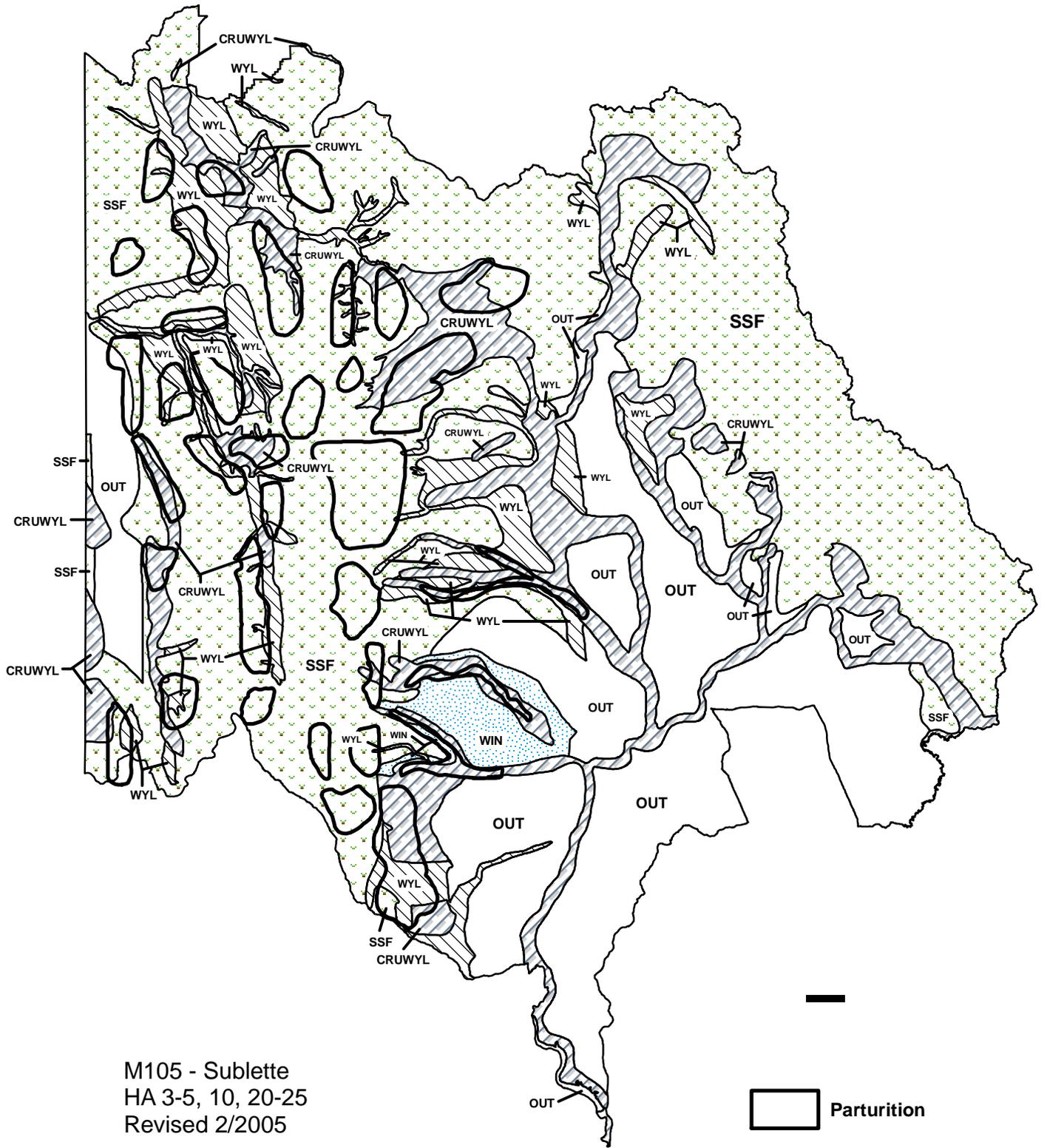


Figure 1. The estimated effect ($\pm 95\%$ CI) of ingesta-free body fat (IFBFat) on probability of pregnancy (A), survival (B), *Elaeophora schneideri* (C; based on known physical symptoms) for adult (>2 yr. old) female Shiras moose in February 2012 from Sublette County, Wyoming. Percent IFBFat was strongly related to pregnancy, survival, and evidence of *Elaeophora*, but not neonate survival (D). Black circles indicate presence (or a positive demographic outcome) and open circles represent absence (or a negative demographic outcome).



2013 - JCR Evaluation Form

SPECIES: Bighorn Sheep

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

HERD: BS121 - DARBY MOUNTAIN

HUNT AREAS: 24

PREPARED BY: GARY FRALICK

	<u>2008 - 2012 Average</u>	<u>2013</u>	<u>2014 Proposed</u>
Population:	57	60	60
Harvest:	1	0	0
Hunters:	1	0	0
Hunter Success:	100%	0%	0%
Active Licenses:	1	0	0
Active License Percent:	100%	0%	0%
Recreation Days:	2	0	0
Days Per Animal:	2	0	0
Males per 100 Females	56	0	
Juveniles per 100 Females	50	0	

Population Objective:	150
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-60%
Number of years population has been + or - objective in recent trend:	21
Model Date:	02/23/2014

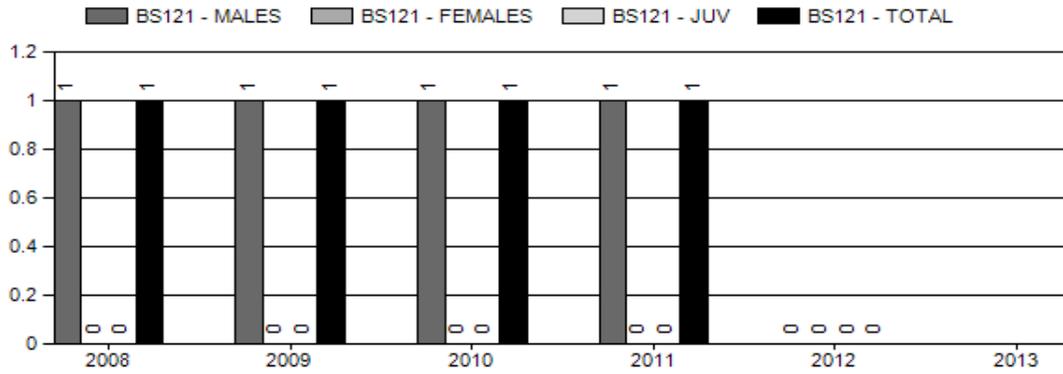
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
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%

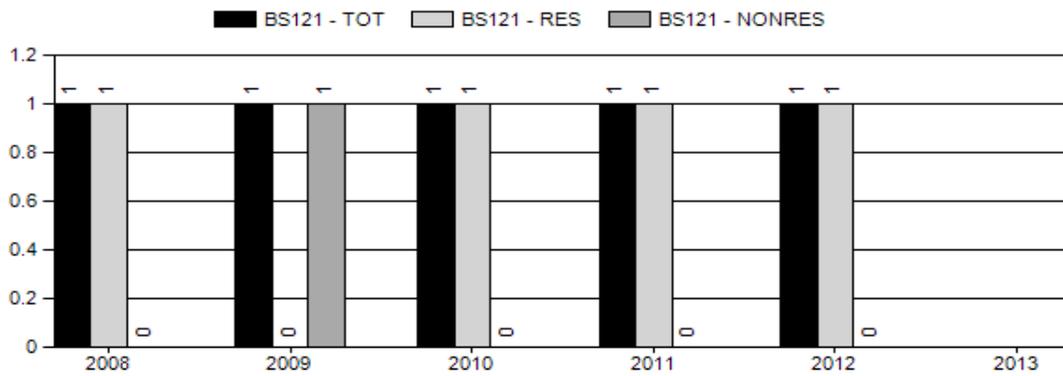
Population Size - Postseason



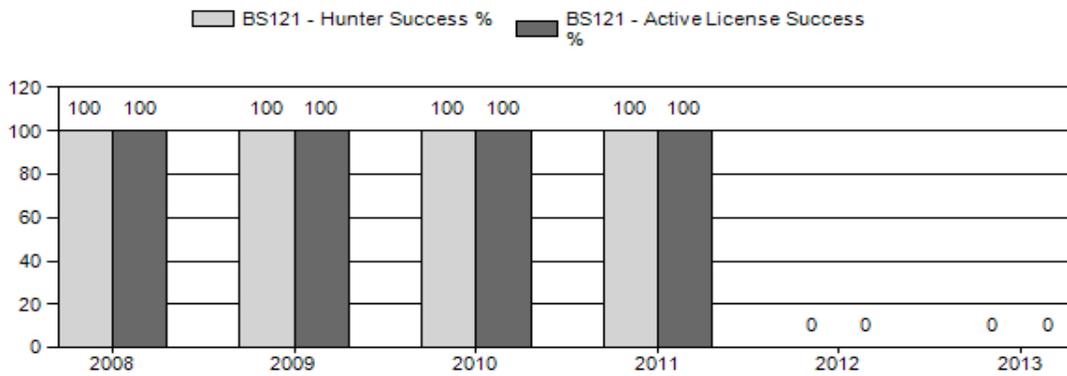
Harvest



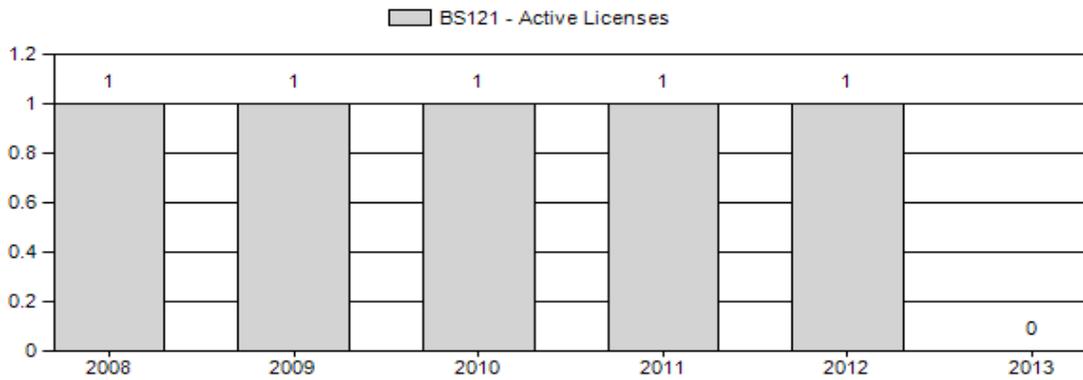
Number of Hunters



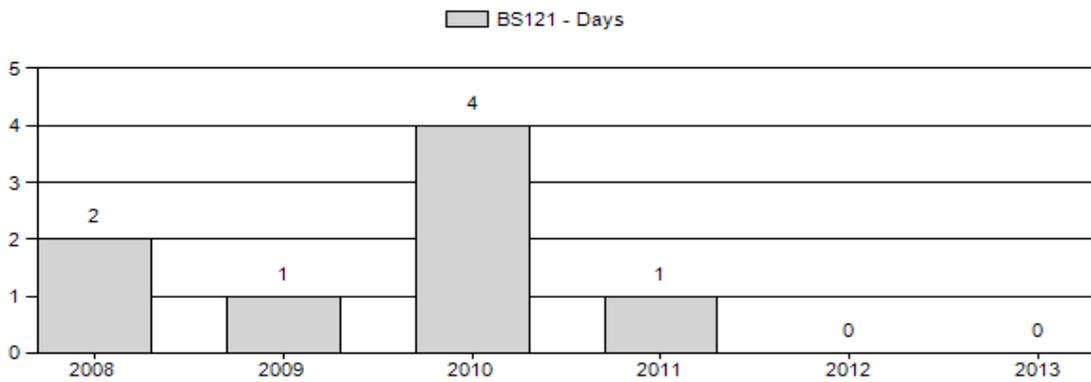
Harvest Success



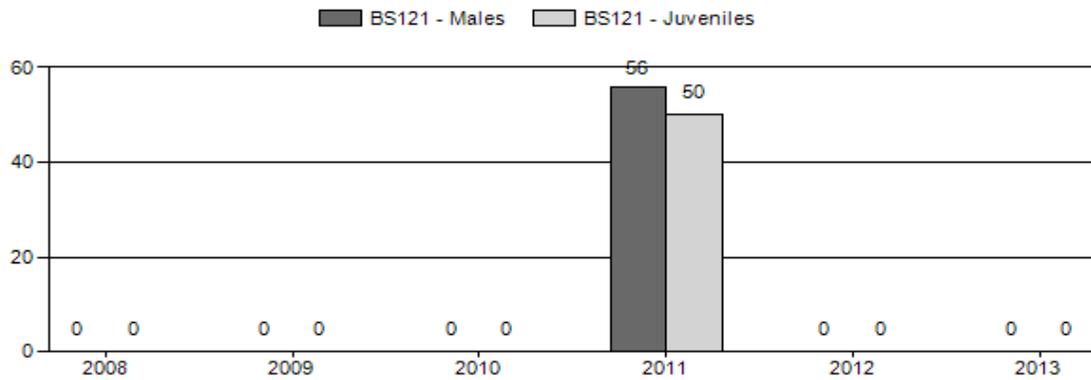
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Bighorn Sheep Herd BS121 - DARBY MOUNTAIN

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot CIs	Cls Obj	Males to 100 Females			Young to			
		Ylg	Adult	Total	%	Total	%	Total	%			Yng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	45	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2009	60	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2010	60	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2011	60	2	8	10	27%	18	49%	9	24%	37	0	11	44	56	± 17	50	± 16	32
2012	60	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2013	60	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0

2014 HUNTING SEASON

SPECIES: BIGHORN SHEEP

HERD UNIT: DARBY MOUNTAIN (BS121)

DARBY MOUNTAIN HERD UNIT - BHS121

<u>HUNT AREA</u>	<u>TYPE</u>	<u>OPENS</u>	<u>CLOSES</u>	<u>LIMITATIONS</u>
24				CLOSED

Management Evaluation

Current Postseason Population Management Objective: 150

Management Strategy: Special

2013 Postseason Population Estimate: 60

2014 Proposed Postseason Population Estimate: 60

The Darby Mountain bighorn sheep herd population objective is 150 sheep. The objective was established in 1991, and will be reviewed in 2015.

The 2014 bighorn sheep hunting season for Hunt Area 24 is closed. Due to the lack of mature rams, low lamb numbers and poor recruitment of sheep from juvenile to older age classes, the Department will maintain this closure for the immediate future.

Herd Unit Issues

In 1981 the Wyoming Game and Fish Department and U.S. Forest Service reintroduced bighorn sheep (*Ovis canadensis*) into the Wyoming Mountain Range, west of Big Piney, Wyoming. The last wild sheep occupied this range in the early 1960s. Competition with domestic sheep and illegal harvest were believed responsible for their extirpation. Prior to

the transplant, domestic sheep were removed from allotments on Fish Creek and Darby Mountain, which provided the best historic bighorn sheep habitat. In January 1981, 35 Rocky Mountain sheep were transplanted from the Whiskey Basin Habitat Unit near Dubois, Wyoming to Fish Creek Mountain. In January 1987, another 25 bighorn sheep were transplanted from Whiskey Basin to the Fish Creek Mountain site. Funding assistance for this relocation effort was provided by the Foundation for North American Wild Sheep (FNAWS).

The estimated herd size in mid-winter 1988 was 110 sheep. However, the actual count on 20 February 1988 was 70 sheep and poor weather prevented completion of the survey. A comprehensive on-ground and aerial survey was conducted from 20 June - 14 July 1988 in approximately a 90 square mile area around Fish Creek Mountain. These surveys resulted in a post-lambing count of a minimum of 124 sheep consisting of 56 ewes, 28 lambs and 40 rams in the herd. In 1988 the first hunt was conducted in Hunt Area 24, based primarily on the results of the previous survey. Four permits were issued with 3/4 curl restrictions and four rams were harvested. The population is estimated to have increased to a maximum of approximately 150 sheep in 1994. The department continued to issue four permits for 3/4 curl rams from 1988 through 1997.

Forage production and availability studies on Fish Creek and Darby Mountain winter ranges, (prior to the 1981 re-introduction) suggested a combined capacity for 150 to 175 sheep in most winters. Other potential wintering sites were identified north and east of Fish Creek Mountain. Since 1981 individuals and small groups of sheep that typically number less than 15 individuals have been observed wintering near Star Hill, above the Middle Piney Creek summer homes, the hydrographic divide between the Greys River and Green River drainages in Box Canyon Creek in Greys River drainage, and the windblown ridge tops in the Straight Creek drainage west of Mount Schidler. Fish Creek Mountain and Darby Mountain continue to support the largest concentrations of wintering sheep.

Most summer observations have occurred within the 90 square mile core area around Fish Creek Mountain. However, since 1994 a few sub legal rams and small ewe-lamb groups have been observed on summer range outside the core area. Summer dispersal of bighorn sheep have been documented along the crest of the Wyoming Mountain Range in the vicinity of the headwaters of South Cottonwood Creek, McDougal Peak, Gunsight Pass, Middle Piney Creek, Straight Creek, North Piney Creek and Roaring Fork drainages as well. This dispersal has resulted in bighorn sheep and domestic sheep mingling on summer ranges in several active sheep allotments.

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, pages 104-123 for Pinedale Region habitat improvement project summaries (<http://wgfd.wyo.gov/web2011/wildlife-1000708.aspx>).

Field Data

In 2009, on-ground surveys were conducted in July, August, and September. These surveys resulted in a total of 49 different sheep observed. Sheep were observed on Fish Creek Mountain, Box Canyon, Marten Creek, and along the spine of the Wyoming Range from Mount Coffin as far north as Red Creek (Greys River). The age/sex classes were as follows: 22 females, 15 lambs, 11 adult rams, and one yearling ram. Herd composition was: 54 rams:100 ewes:68 lambs.

In 2010, an aerial survey was conducted in August. A total of 25 sheep were observed. The age/sex classes were noted as follows: 17 ewes, 7 lambs; 1 yearling ram, and 1 adult ram.

In February 2012, an aerial survey was conducted along the crest of the Wyoming Range south of Marten Creek to Wyoming Peak, and included Fish Creek and Darby Mountains. A total of 37 sheep were observed. The age/sex classes were noted as follows: 8 adult rams, 2 yearling rams, 18 ewes, and 9 lambs.

Harvest

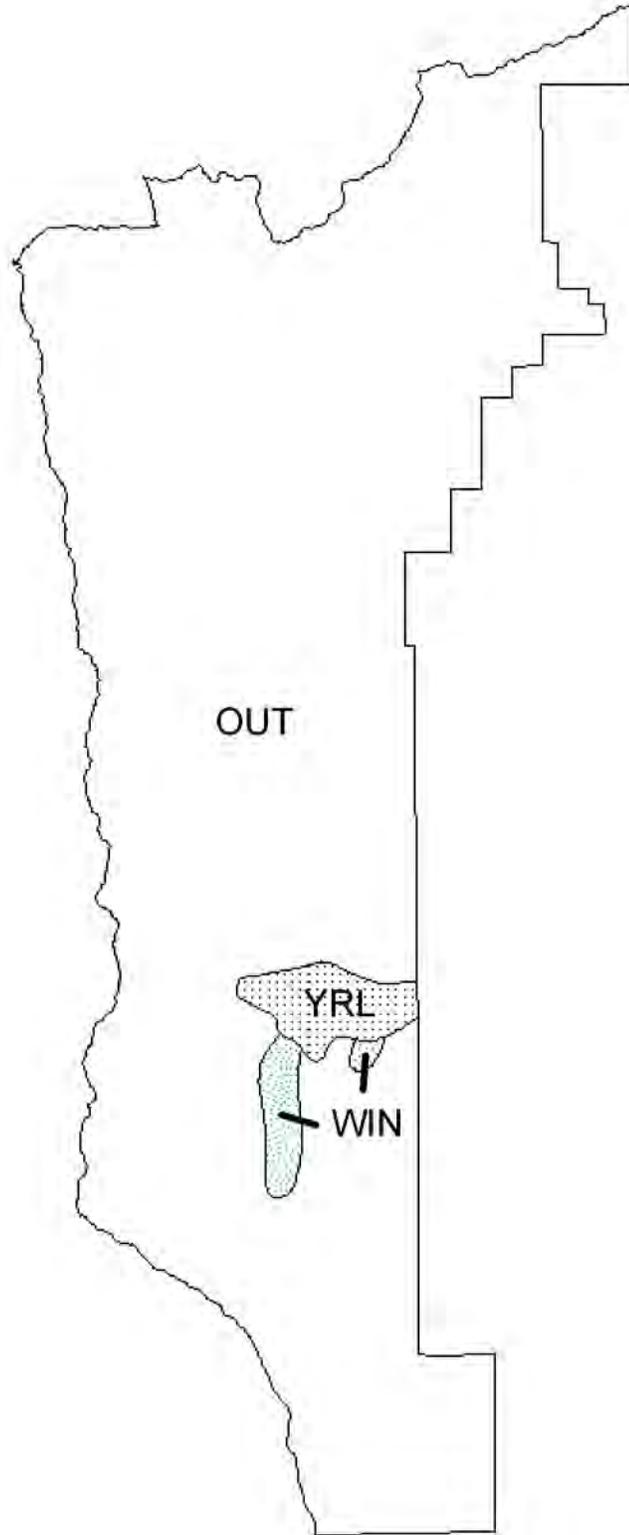
One license valid for any ram was issued for this hunt area from 2008 to 2012, respectively. A total of four rams were harvested from 2008 – 2011. In 2012, the one licensed hunter observed very few sheep and could not find a mature ram older than 5 years of age after 15 total days of hunting. The lack of sheep observed by the hunter is consistent with Department field surveys over the past five years.

Population

The population has stabilized at approximately 60 sheep. Systematic surveys, typically conducted from a helicopter in winter, have resulted in fewer than 60 sheep observed. Summer on-ground surveys conducted in August have identified the Box Canyon and Fish Creek Mountain areas as locations that typically support the highest aggregations of sheep.

Management Summary

The 2014 bighorn sheep hunting season for Hunt Area 24 is proposed to be closed. Due to the lack of mature rams, low lamb numbers and poor recruitment of sheep from juvenile to older age classes, the Department will maintain this hunt area closure for the immediate future. The hunting season will be closed until such time that an adequate number of rams can be documented to sustain a hunting season over time.



BHS 121- Darby Mtn.
HA 24
Revised 7/02

BRUCELLOSIS MANAGEMENT (EL104) - 2013

BRUCELLOSIS/POPULATION SURVEILLANCE & EARTAG RETURNS

McNeel Feedground

In 2014, two elk were captured via chemical immobilization on McNeel feedground in mid-February primarily to remove a radio-collar deployed in 2013 that had not dropped. Both elk were bled for brucellosis testing, but one sample froze and was not testable (Table 1).

Dell Creek Feedground

For the seventeenth consecutive winter, elk were captured via corral trap (rebuilt summer 2012) at Dell Creek feedground for ongoing brucellosis surveillance and associated research regarding strain 19 vaccination efficacy. Sixty-three elk (43 newly tagged) were captured and processed during one trap day in February. All elk were ear-tagged, and yearling and adult females were bled and received visibility collars.

In 2014, brucellosis seroprevalence of yearling and older females as determined by the four standard (card, SPT, Riv, CF) and cELISA tests was 0% (0/1) and 39% (14/36) at McNeel and Dell Creek (Table 1). The sample size from McNeel is too small for adequate statistical confidence (i.e., $\geq 85\%$), however, samples pooled among years give average seroprevalence of 58%. Seroprevalence at Dell Creek feedground averages 35%. Dell Creek feedground remains the control (i.e., non-vaccinated) site for the *Brucella* strain 19 elk vaccination program. Average seroprevalence of all animals captured in EL104 from 1997 through 2011, is 36% (n = 239/666).

Table 1. Total seropositive, seronegative, and percent seroprevalent elk based on 4 standard tests and cELISA from Dell Creek and McNeel feedgrounds, 1998-2014.

<u>Feedground</u>	<u>Year</u>	<u>Positive</u>	<u>Count</u>		<u>% Seroprevalence</u>
			<u>Negative</u>	<u>Total</u>	
Dell Creek	1998	9	25	34	26
	1999	18	18	36	50
	2000	10	12	22	45
	2001	9	26	35	26
	2002	12	22	34	35
	2003	11	19	30	37
	2004	3	33	36	8
	2005	6	28	34	18
	2006	5	25	30	17
	2007	6	31	37	16
	2008	10	33	43	23
	2009	12	32	44	27
	2010	13	24	37	35
	2011	20	26	46	44
	2012	14	10	24	58
2013	44	24	68	65	
2014	14	22	36	39	
Sum	216	410	626	Mean = 35	
McNeel	1997	0	2	2	0
	1998	9	2	11	82
	2011	5	2	7	71
	2012	7	6	13	54
	2013	2	4	6	33
	2014	0	1	1	0
	Sum	23	17	40	Mean = 58
E104	Sum	239	427	666	Mean = 36

A total of 1,356 individual elk were captured and tagged on feedgrounds between in EL104 between 1997 and 2013. Among these, information of 195 harvested elk were returned to the WGFD. A breakdown of eartag return locations by elk herd unit is in Table 2. Nearly 70% of all elk tagged in the Hoback herd were harvested in the Hoback herd unit, and a considerable number of returns were reported from the Fall Creek and Upper Green River elk herd units.

Table 2. Proportion of elk eartag returns of elk captured and tagged on Dell Creek and McNeel feedgrounds in the Hoback elk herd from 1997-2013.

Hoback elk eartag return summary; 1997-2013			
Location of harvest	Number of returns	Percent of total tag returns	Percent of all tagged elk
Hoback herd	135	69.2%	10.0%
Fall Cr. herd	21	10.8%	1.5%
Upper Green R.	17	8.7%	1.3%
Jackson herd	7	3.6%	0.5%
Unreported herd	7	3.6%	0.5%
Piney herd	5	2.6%	0.4%
Wiggins Fk. Herd	3	1.5%	0.2%
Total	195	100%	1356

STRAIN 19 BALLISTIC VACCINATION

McNeel Feedground

Vaccination was conducted during several days in April 2014 during above average temperatures, receding snow, and diminishing dependency of elk on alfalfa hay. Approximately 95 of 189 juveniles classified (50%) were vaccinated. Since 1992, at least 2,905 of a possible 3,136 juveniles (92%), 706 adult females, and several undocumented yearlings have been vaccinated.

Dell Creek Feedground

No strain 19 vaccination has occurred at this feedground. This site hosts the control population for comparison of seroprevalence and reproductive failure data with other vaccinated feedground elk. Active surveillance and analysis of associated data is ongoing.

RESEARCH – STRAIN 19 VACCINATION EFFECTS ON SEROPREVALENCE & ABORTIONS

The index of exposure to *Brucella* that is seroprevalence and the influence of strain 19 (s19) vaccination on elk seroprevalence levels in field conditions is not well understood, has been hotly debated, and thus is under current investigation. In captive studies, vaccination with s19 has shown to modestly reduce proportions of captive elk that aborted (25% - 60%) following challenge with *Brucella abortus* field strain 2308. However, no field study has assessed efficacy of the s19 program based on abortions. WGFD initiated the s19 ballistic vaccination program in 1985 at Grey's River feedground, and by 1997, all state-maintained feedgrounds (excluding Dell Creek) were incorporated. The NER initiated vaccination for three years in the late 1980's but discontinued the program until 2003 following completion of associated EIS. During s19 program initiation, juvenile and female elk were vaccinated from one to four years, then only juveniles thereafter. Among feedgrounds, targeted coverage of females averaged 66.5% per year and ranged from 21.5% on the NER to 101% at Scab Creek. Among feedgrounds, annual coverage of juveniles has averaged 98.8% per year.

Assessment of the s19 program has focused primarily on ocular comparison of serology data from Grey's River (vaccinated) and Dell Creek (non-vaccinated) elk, as well as determination of trend in Grey's River serology following inception of the s19 program. Given the length of time that the s19 program has occurred among the feedground metacomplex, however, provides a much larger dataset for more appropriate comparisons and investigations of seroprevalence trend. To determine the proportion of seropositive elk aborting and birthing among vaccinated and non-vaccinated feedgrounds, BFH personnel have also utilized vaginal implant transmitters

(VITs) from 2006-2013. For seroprevalence data, BFH personnel split data between yearling and adult females, pooled seroprevalence data within feedgrounds, then among or within years (depending on type of analysis) to provide significant sample sizes (bound on the error of estimation of +/-15%), incorporated an arcsine-square root transformation to normalize seroprevalence data, set alpha at 0.05, and utilized parametric t-tests for comparisons. For VIT abortion and birth data, BFH personnel compared data among feedgrounds with no s19 vaccination, less than 100% coverage of juveniles, greater than or equal to 100% coverage (Table 3) of juveniles by use of a chi-square test of association.

Table 3. Total abortions and viable births among seropositive elk from feedground populations with varying levels of vaccination coverage, 2006-2013.

Outcome	Average Annual s19 Coverage of Juvenile Elk			
	0%	<100%	≥100%	≥ 0%
Abortion	8	15	0	15
Viable Birth	27	57	15	72

Paired data for yearlings ($t_{15, 16} = -0.15$, $P = 0.44$) and adults ($t_{15, 16} = -0.44$, $P = 0.33$) from 1998-2013 show no difference between mean seroprevalence of vaccinated Grey’s River and unvaccinated Dell Creek populations. Among all feedgrounds from 1971-2013 for yearlings, seroprevalence prior to (mean = 16%, $n = 14$) and following (mean = 14%, $n = 17$) inception of s19 suggests that seroprevalence has not been lowered by s19 ($t_{14, 29} = -0.25$, $P = 0.40$). Among all feedgrounds from 1971-2013 for adults, seroprevalence prior to (mean = 29%, $n = 14$) and following (mean = 33%, $n = 18$) inception of s19 suggests that seroprevalence has been not lowered but rather raised by s19 ($t_{15, 31} = -1.30$, $P = 0.04$; Figure 1). Chi-square analysis shows no association of fewer abortions among categories (0%, <100%, ≥ 100%) of s19 vaccination coverage ($\chi^2_{2, 122} = 4.04$, $P = 0.13$).

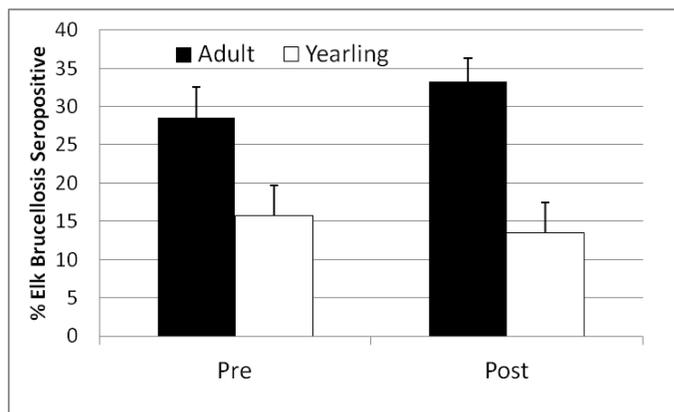


Figure 1. Mean (+SE) seroprevalence of brucellosis in adult and yearling feedground elk pre and post-vaccination.

Based on these analyses, the s19 program has not affected seroprevalence or abortion rate at the population level. Despite the use of s19 or levels of coverage, numerous abortions continue to occur on feedgrounds allowing the disease to perpetuate in elk. Although one-time booster doses of s19 have shown no positive effect in elk immune response, an orally delivered s19 vaccine has shown positive effects. Furthermore, the addition of adjuvants to s19 is currently being explored. Other alternatives to s19 to minimize elk exposure to and/or contact with abortions include 1) Target Feedground strategies including Low-Density Feeding and Early End-Date, 2) Habitat treatments adjacent to feedgrounds, and/or 3) immunocontraception). Test and slaughter has been tested as a pilot project, and although effective at reducing seroprevalence, it is extremely cost-prohibitive when compared to habitat treatments, early end-date, and especially LD Feeding. Final analyses and a manuscript on the history and efficacy of the s19 program are currently being produced.

RESEARCH – ELK PARTURITION

In conjunction with several collaborative research projects including elk parturition ecology and accuracy of currently delineated elk parturition areas, BFH personnel continued a multi-year project on several feedgrounds including Dell Creek and McNeel in EL104. In 2013, 12 VITs were deployed and recovered from elk captured on Dell Creek (n = 8) and McNeel (n = 4) feedgrounds; all VITs were associated with viable births and birth site habitats ranged from low-elevation aspen/willow to high-elevation rock and sparse conifer (Fig. 2A). From 2008 to 2013, 78 VITs were deployed in elk captured on Dell Creek (n = 56) and McNeel (n = 22) feedgrounds. A total of 59 parturition sites and 10 abortions have been documented; 6 elk were not pregnant upon blood tests, 2 elk died prior to expelling their VITs, and one VIT was never heard after deployment (unknown). Birthsites occurred within both EL104 and EL103 unit boundaries, and only one occurred within currently delineated WGFD elk parturition areas in the Hoback herd unit (Figure 2B). In 2014, two VITs were deployed at Dell Creek out of 17 elk tested for pregnancy, and no VITs were deployed at McNeel.

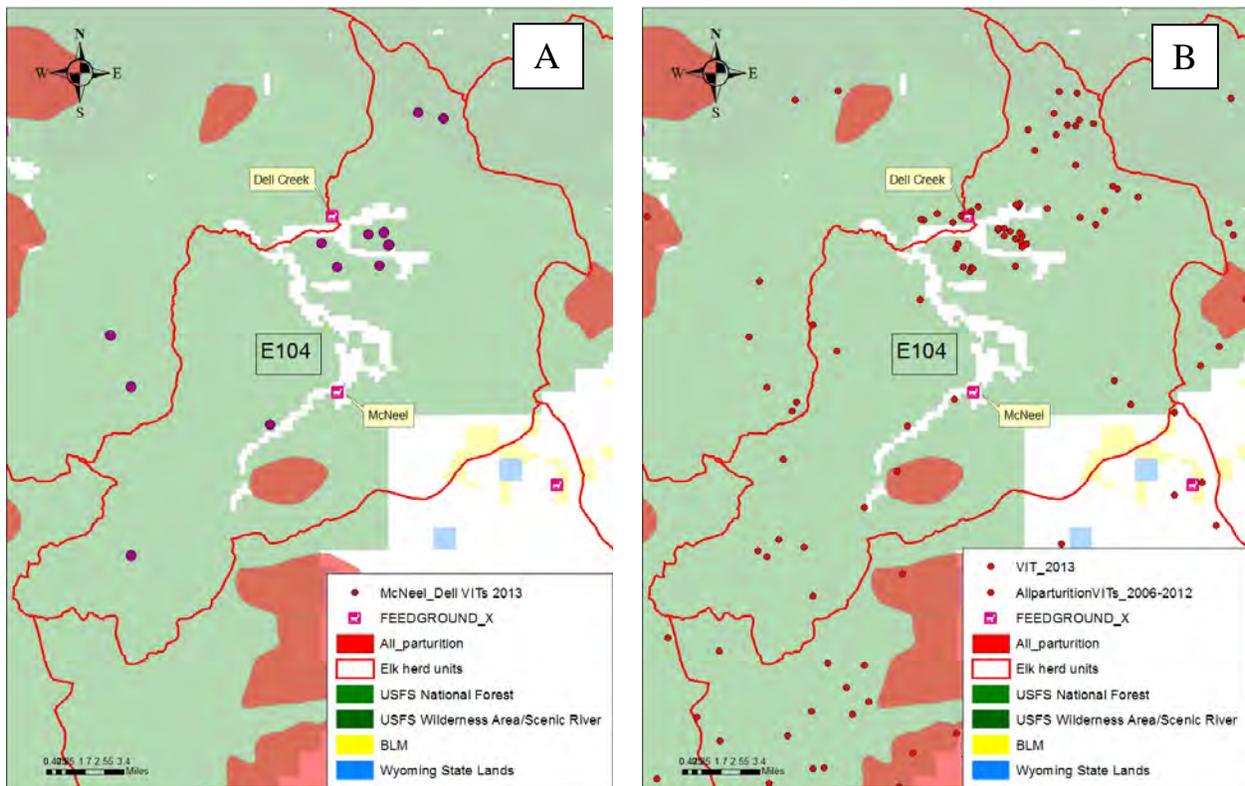


Figure 2. VIT locations from Dell Creek and McNeel Feedgrounds (2013, A; 2008-2013, B) and overlap with WGFD elk parturition areas.

Starting in 2011, BFH personnel began deploying GPS radio-collars on elk in EL104 to assess overlap with the proposed PXP natural gas exploration project and to gain additional information on elk distribution and possible overlap with adjacent herd units. Leases from the proposed PXP herd unit were retired following purchase or “buy-out” in 2013. From 2012 to 2013, 16 GPS collars were deployed on elk from McNeel Feedground; one elk died on the feedground, and data were inadequate and censured from the study. Each collar obtained a location every 30-minutes for approximately one year. Locations from the remaining 15 elk show that the majority stayed within EL104, yet five elk spent a substantial portion of time in Cliff Creek (EL103), and one elk relocated to Dog Creek Feedground (Figure 3). In 2014, 4 GPS collars were deployed at Dell Creek. One elk died the day following capture and this collar was redeployed at Scab Creek Feedground (EL108).

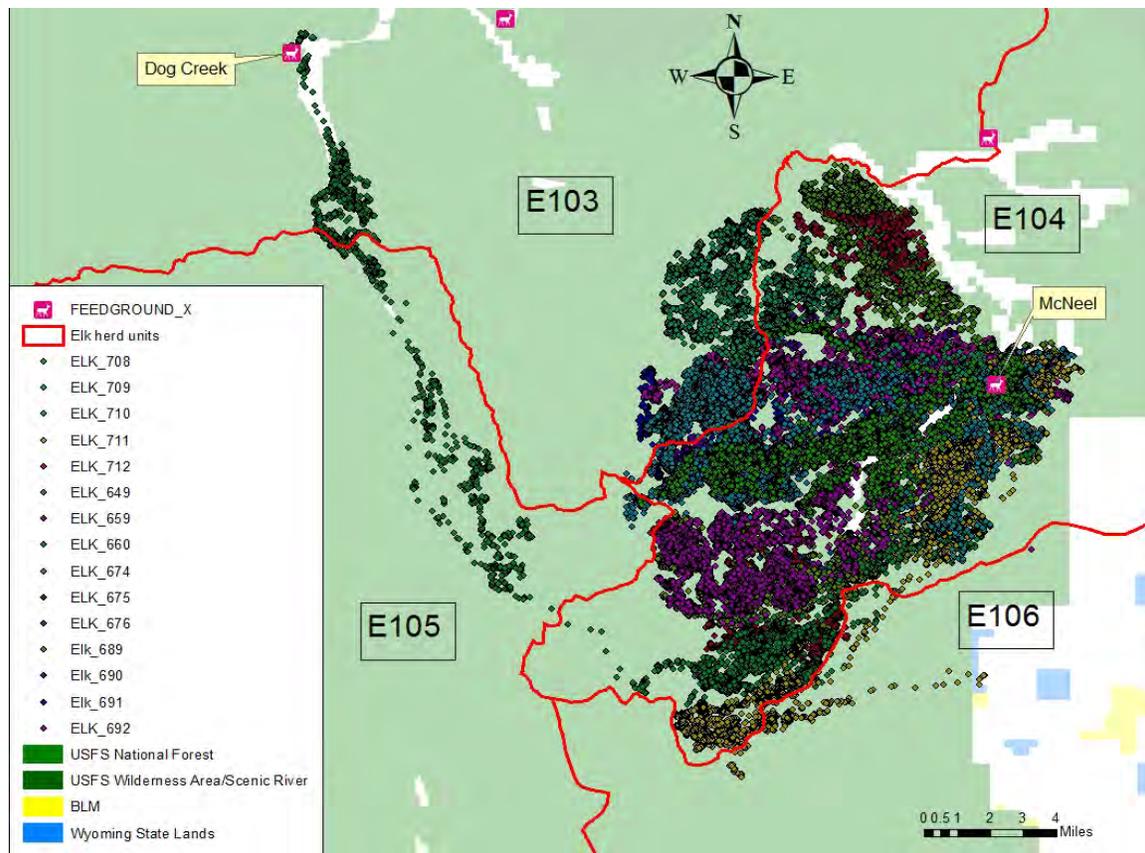


Figure 3. GPS collar locations of 15 elk from McNeel feedground, 2012-2014.

BRUCELLOSIS MANAGEMENT (EL106) – 2013

BRUCELLOSIS/POPULATION SURVEILLANCE & EAR TAG RETURNS

During February and March of 2014, 13 adult female elk were captured on Franz (3), Jewett (2), Bench Corral (5) and Finnegan (3) feedgrounds by use of chemical immobilization. All elk had ear tags and visibility collars applied and blood samples taken. Captures were a collaboration among the WGFD, University of Wyoming, University of Montana, and USGS in conjunction with several research projects including brucellosis monitoring (ongoing since 1971); elk parturition ecology, analysis of WGFD parturition areas, and interspecific brucellosis transmission risk (ongoing since 2006); efficacy of the strain 19 vaccination program (ongoing since 2008); and assessment of the capture drug BAM on elk.

In 2014, brucellosis seroprevalence of females was 67%, 50%, 0%, and 0% at Franz, Jewett, Bench Corral, and Finnegan (Table 1). The sample sizes from all feedgrounds sampled in 2014 was too small for adequate statistical confidence ($\geq 85\%$), therefore no inferences should be made to this population based on 2014 estimates. Average seroprevalence of all animals captured in EL106 from 1982 through 2014, incorporating cELISA corrections for strain 19 vaccination titers, is 26.0% ($n = 131/503$).

Table 1. Number of yearling and adult female elk testing positive and negative for antibodies of brucellosis, total tested, and % brucellosis seroprevalence of elk sampled from feedgrounds in E106, 1982-2014.

<u>Feedground</u>	<u>Year</u>	<u>Positive</u>	<u>Negative</u>	<u>Total</u>	<u>Prevalence (%)</u>
Finnegan	1982	0	14	14	0
	1983	0	14	14	0
	1984	1	2	3	33
	1989	0	13	13	0
	2001	6	27	33	18
	2009	6	26	32	18
	2010	0	1	1	0
	2014	0	3	3	0
	Sum		13	100	113
Franz	1983	14	12	26	54
	1984	3	12	15	20
	1985	3	15	18	17
	2003	19	32	51	37
	2005	12	23	35	34
	2009	2	2	4	50
	2010	5	2	7	71
	2011	4	0	4	100
	2012	1	0	1	100
	2014	2	1	3	67
Sum		65	99	164	40

North Piney	1990	6	15	21	29
	1991	2	19	21	10
	Sum	8	34	42	19
Bench Corral	2006	4	26	30	13
	2007	3	11	14	21
	2008	0	4	4	0
	2014	0	5	5	
	Sum	7	46	51	14
Jewett	2010	0	5	5	0
	2011	8	27	35	23
	2012	8	25	33	24
	2013	23	35	58	40
	2014	1	1	2	50
	Sum	40	93	133	30
EI106	Sum	131	372	503	26

A total of 904 individual elk were captured and tagged on Jewett (400), Franz (282), Finnegan (169) and Bench Corral (53) feedgrounds between 2001 and 2013. Among these, information of 148 harvested elk were returned to the WGFD. A breakdown of eartag return locations by elk herd unit is in Table 2. Most elk tagged in the Piney herd were harvested in the Piney herd, and nearly 19% were harvested in the Hoback herd, comprised mostly of elk tagged at Franz feedground.

Table 2. Proportion of elk eartag returns of elk captured and tagged on feedgrounds in the Piney elk herd from 2001-2013.

Piney elk eartag return summary; 2001-2013			
Location of harvest	Number of returns	Percent of total tag returns	Percent of all tagged elk
Piney herd	108	73.0%	12.4%
Hoback herd	28	18.9%	3.2%
Afton herd	3	2.0%	0.3%
Upper GR herd	3	2.0%	0.3%
Unreported herd	3	2.0%	0.3%
West GR herd	1	0.7%	0.1%
Fall Cr. herd	1	0.7%	0.1%
Pinedale herd	1	0.7%	0.1%
Total	148	100%	869

STRAIN 19 BALLISTIC VACCINATION

Bench Corral Feedground

The strain 19 vaccination program was implemented at this feedground in 1997. Since 1997, the proportion of juveniles vaccinated relative to those classified annually averages 68%; this is second lowest among all vaccinated feedgrounds but is similar to the NER (64%), Gros Ventre (82%), and Soda Lake (83%) where winter conditions tend to be mild and elk are subsequently less dependent on supplemental forage and tolerant of human disturbance. Because elk on this feedground are extremely skittish, most elk that are vaccinated are not marked, and during multiple operations, some animals may be vaccinated twice. In 2014, only 18/156 (12%) of juveniles were vaccinated during one day in early March following several days of the feeder conditioning elk to the gun. The total number of vaccine doses administered to all elk (juvenile and older) at this feedground since 1997 is 2,520.

Finnegan Feedground

Since 1996, the proportion of juveniles vaccinated annually has averaged 106% suggesting that some yearling females have received boosters or elk have immigrated to the feedground between classification and vaccination. In 2014, 40/65 (62%) juveniles were vaccinated over several days in March and April. Since 1996, at least 1,283 juveniles, 172 adult females and likely numerous yearlings have been vaccinated.

Franz Feedground

Vaccination was completed at this feedground for the 18th consecutive year. Since 1997, the average proportion of juveniles vaccinated annually has been 94%. In 2014, 59 of 47 juveniles (126%) were vaccinated during several days from February through March. At least 1,806 juveniles, 545 adult females, and likely numerous yearlings have been vaccinated on this feedground since program initiation.

Jewett Feedground

Strain 19 vaccination was completed for the 17th consecutive winter at this feedground, and since 1997, average annual coverage of juveniles has been 109%. From February through early April, 200 of 173 (116%) juveniles were vaccinated. Since 1997, at least 3377 juveniles, 547 adult females, and likely numerous yearling females have been vaccinated.

North Piney Staging Area

Since 1996, elk have migrated from this site to Bench Corral feedground from mid-late January, which is prior to the initiation of vaccination activities on Bench Corral or other feedgrounds. Therefore, elk are vaccinated on this feedground but are vaccinated at Bench Corral. In 2014, about 50 elk staged at North Piney and moved to Bench Corral in late December.

RESEARCH –ELK PARTURITION

To document elk abortions and brucellosis transmission event, to facilitate understanding of elk parturition ecology, and in preparation of updating WGFD elk parturition areas, BFH personnel continued research in E106 by deploying vaginal implant transmitters (VITs) in elk attending Jewett (n=2) and Franz (n=2) feedgrounds in 2013. All VITs were recovered; one was from an abortion on the edge of Franz Feedground, and three were associated with live births (Figure 1). Live births occurred in aspen and aspen/sage edge (Jewett) as well as decadent conifer/aspen (Franz). From 2006 through 2013, elk birth sites in EL106 have ranged from willow/riparian areas on private lands to treeline on USFS lands, but have occurred primarily in aspen/conifer habitats on USFS lands (including the Maki prescribed, and Horse Creek and Mule wildfire burn areas). Three of four live births in 2013 were within current WGFD elk parturition areas (Figure 1), and based on all VITs associated with live births in E106 elk from 2006 through 2013, 28% (n =18/65) have occurred within current WGFD elk parturition areas. VIT data from 2006-2013 coupled with GPS collar data from 2008-2013 will be used as elk parturition areas are updated. In 2014, elk from Franz (3), Jewett (1), Bench Corral (4), and Finnegan (3) were fitted with VITs; three of these animals were seropositive and none have aborted as of early June.

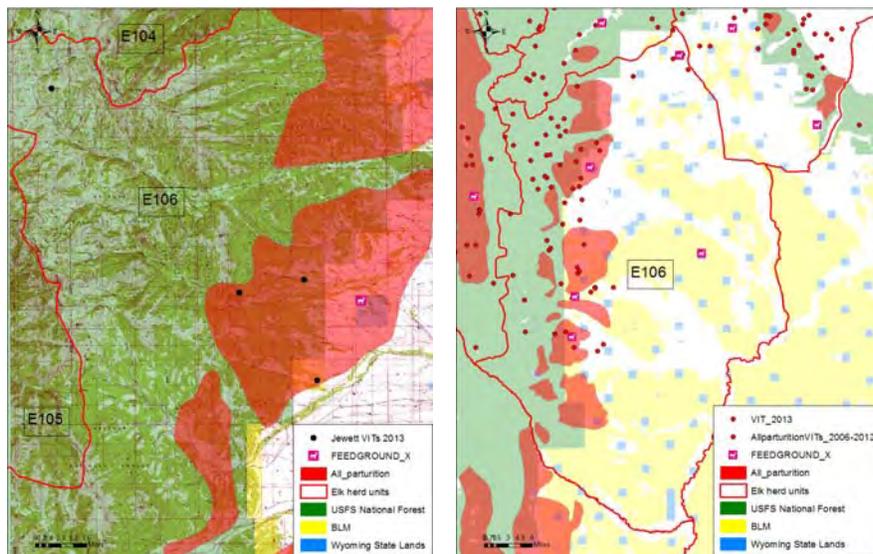


Figure 1. Jewett birth locations and overlap with current elk parturition areas (left), and all E106 birth locations and overlap with current elk parturition areas (right).

RESEARCH/MANAGEMENT – TARGET FEEDGROUND PROJECT

In summer 2007, BFH personnel initiated a project to reduce brucellosis transmission/seroprevalence using novel techniques on feedgrounds with low potential for commingling/damage (Bench Corral, Forest Park, Green River Lakes, Soda Lake, and Fall Creek). Goals of the project were to reduce contacts of elk with aborted fetuses by 1) instituting altered feeding patterns (Low-Density vs. traditional feedline) from early February through end of feeding, 2) attempting to actively (management decision) rather than passively (elk decision)

end feeding, and 3) promoting late-season free-ranging by switching from alfalfa to grass hay (reduced palatability, preference).

In 2012, Low-Density (LD) feeding was incorporated in EL106 on Bench Corral, Jewett, and Franz feedgrounds, occurring from 1 February through end of feeding. At Bench Corral, LD feeding was again enhanced by use of a large tractor and bale-feeder, allowing for precise distribution of hay in multiple rows across the feedground with minimal physical effort on part of the feeder. Feeders at Jewett and Franz initially had good success implementing LD feeding then had to recover following a series of storms in February. However, feeders at Franz and particularly Jewett were able to slowly expand the feeding area and incorporate multiple lines (i.e, 4-8 Franz, 8-16 Jewett) thereafter. Through consistent communication with the Big Piney warden, feedground, and BFH personnel, a favorable long-term forecast, and new feedground compensation plan that uses the long-term end date as a tentative season end-date, feeding at Bench Corral was ended 21 March 2012. This is three days over the average end-date (2000-2013). No attempts were made to use grass hay at the end of the feeding season to encourage elk to free-range from any EL106 feedgrounds. It was reported that around 50 elk briefly attended and departed the North Piney Staging Area in early January, and no damage situations were reported from this migration to Bench Corral.

RESEARCH – USING ELK GPS COLLAR, SWE, HARVEST, AND POPULATION DATA to EDUCATE PUBLIC HUNTERS & INCREASE HARVEST

To help better understand elk movement and distribution during hunting season, increase harvest, and balance the Piney elk herd, BFH personnel used existing elk GPS collar data (n = 38), local snow water equivalent (SWE, n = 4 sites), hunter success, and elk population data to generate maps, figures, and statistics for public presentations in Big Piney and Pinedale. This initiative came from the request and approval of the JN/PE wildlife coordinator, PE supervisor, and administration. Results show that in the last 10 years 1) the Piney herd has been stable but over objective, 2) number of type 6 (cow/calf) tags as well as days to hunt later in the season have increased, 3) SWE is highly correlated with cow/calf harvest, especially in November ($R^2 = 0.67$, Figure 2), 4) elk avoid high-traffic areas (i.e., S. Beaver, N. Horse Roads, Hoback Ranches), and 5) elk shift use from USFS lands in October/November to feedgrounds in December/January (Figure 3). Meetings in Big Piney and Pinedale were attended by 13 and 15 members of the public, respectively. Feedback from the meetings was positive, including several individuals who used the information to hunt and harvest elk.

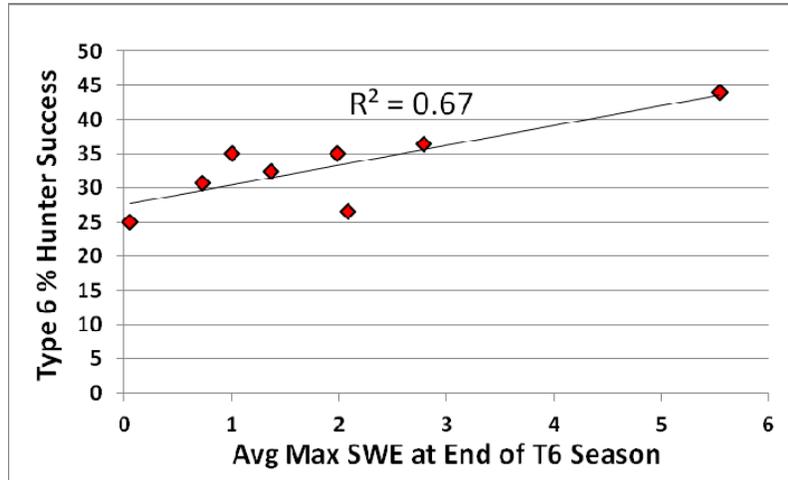


Figure 2. Correlation between Type 6 (cow/calf) tag hunter success and snow water equivalent (SWE) at the end of the Type 6 season.

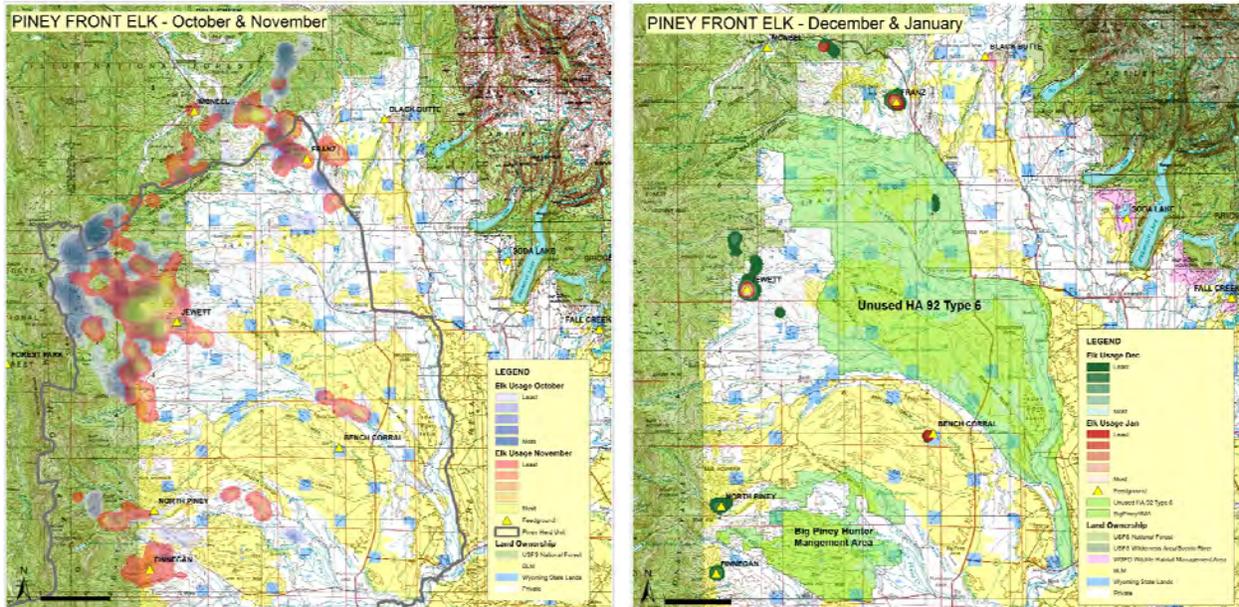


Figure 3. Kernel density estimator maps based on GPS locations of elk during October & November (left) and December & January plus late-season hunt areas (right) in EL106. Isolated locations away from feedgrounds in December & January result from mortalities or collars dropped off of feedgrounds.

BRUCELLOSIS MANAGEMENT (EL106) – 2013

BRUCELLOSIS/POPULATION SURVEILLANCE & EAR TAG RETURNS

During February and March of 2014, 13 adult female elk were captured on Franz (3), Jewett (2), Bench Corral (5) and Finnegan (3) feedgrounds by use of chemical immobilization. All elk had ear tags and visibility collars applied and blood samples taken. Captures were a collaboration among the WGFD, University of Wyoming, University of Montana, and USGS in conjunction with several research projects including brucellosis monitoring (ongoing since 1971); elk parturition ecology, analysis of WGFD parturition areas, and interspecific brucellosis transmission risk (ongoing since 2006); efficacy of the strain 19 vaccination program (ongoing since 2008); and assessment of the capture drug BAM on elk.

In 2014, brucellosis seroprevalence of females was 67%, 50%, 0%, and 0% at Franz, Jewett, Bench Corral, and Finnegan (Table 1). The sample sizes from all feedgrounds sampled in 2014 was too small for adequate statistical confidence ($\geq 85\%$), therefore no inferences should be made to this population based on 2014 estimates. Average seroprevalence of all animals captured in EL106 from 1982 through 2014, incorporating cELISA corrections for strain 19 vaccination titers, is 26.0% ($n = 131/503$).

Table 1. Number of yearling and adult female elk testing positive and negative for antibodies of brucellosis, total tested, and % brucellosis seroprevalence of elk sampled from feedgrounds in E106, 1982-2014.

<u>Feedground</u>	<u>Year</u>	<u>Positive</u>	<u>Negative</u>	<u>Total</u>	<u>Prevalence (%)</u>
Finnegan	1982	0	14	14	0
	1983	0	14	14	0
	1984	1	2	3	33
	1989	0	13	13	0
	2001	6	27	33	18
	2009	6	26	32	18
	2010	0	1	1	0
	2014	0	3	3	0
	Sum		13	100	113
Franz	1983	14	12	26	54
	1984	3	12	15	20
	1985	3	15	18	17
	2003	19	32	51	37
	2005	12	23	35	34
	2009	2	2	4	50
	2010	5	2	7	71
	2011	4	0	4	100
	2012	1	0	1	100
	2014	2	1	3	67
Sum		65	99	164	40

North Piney	1990	6	15	21	29
	1991	2	19	21	10
	Sum	8	34	42	19
Bench Corral	2006	4	26	30	13
	2007	3	11	14	21
	2008	0	4	4	0
	2014	0	5	5	
	Sum	7	46	51	14
Jewett	2010	0	5	5	0
	2011	8	27	35	23
	2012	8	25	33	24
	2013	23	35	58	40
	2014	1	1	2	50
	Sum	40	93	133	30
EI106	Sum	131	372	503	26

A total of 904 individual elk were captured and tagged on Jewett (400), Franz (282), Finnegan (169) and Bench Corral (53) feedgrounds between 2001 and 2013. Among these, information of 148 harvested elk were returned to the WGFD. A breakdown of eartag return locations by elk herd unit is in Table 2. Most elk tagged in the Piney herd were harvested in the Piney herd, and nearly 19% were harvested in the Hoback herd, comprised mostly of elk tagged at Franz feedground.

Table 2. Proportion of elk eartag returns of elk captured and tagged on feedgrounds in the Piney elk herd from 2001-2013.

Piney elk eartag return summary; 2001-2013			
Location of harvest	Number of returns	Percent of total tag returns	Percent of all tagged elk
Piney herd	108	73.0%	12.4%
Hoback herd	28	18.9%	3.2%
Afton herd	3	2.0%	0.3%
Upper GR herd	3	2.0%	0.3%
Unreported herd	3	2.0%	0.3%
West GR herd	1	0.7%	0.1%
Fall Cr. herd	1	0.7%	0.1%
Pinedale herd	1	0.7%	0.1%
Total	148	100%	869

STRAIN 19 BALLISTIC VACCINATION

Bench Corral Feedground

The strain 19 vaccination program was implemented at this feedground in 1997. Since 1997, the proportion of juveniles vaccinated relative to those classified annually averages 68%; this is second lowest among all vaccinated feedgrounds but is similar to the NER (64%), Gros Ventre (82%), and Soda Lake (83%) where winter conditions tend to be mild and elk are subsequently less dependent on supplemental forage and tolerant of human disturbance. Because elk on this feedground are extremely skittish, most elk that are vaccinated are not marked, and during multiple operations, some animals may be vaccinated twice. In 2014, only 18/156 (12%) of juveniles were vaccinated during one day in early March following several days of the feeder conditioning elk to the gun. The total number of vaccine doses administered to all elk (juvenile and older) at this feedground since 1997 is 2,520.

Finnegan Feedground

Since 1996, the proportion of juveniles vaccinated annually has averaged 106% suggesting that some yearling females have received boosters or elk have immigrated to the feedground between classification and vaccination. In 2014, 40/65 (62%) juveniles were vaccinated over several days in March and April. Since 1996, at least 1,283 juveniles, 172 adult females and likely numerous yearlings have been vaccinated.

Franz Feedground

Vaccination was completed at this feedground for the 18th consecutive year. Since 1997, the average proportion of juveniles vaccinated annually has been 94%. In 2014, 59 of 47 juveniles (126%) were vaccinated during several days from February through March. At least 1,806 juveniles, 545 adult females, and likely numerous yearlings have been vaccinated on this feedground since program initiation.

Jewett Feedground

Strain 19 vaccination was completed for the 17th consecutive winter at this feedground, and since 1997, average annual coverage of juveniles has been 109%. From February through early April, 200 of 173 (116%) juveniles were vaccinated. Since 1997, at least 3377 juveniles, 547 adult females, and likely numerous yearling females have been vaccinated.

North Piney Staging Area

Since 1996, elk have migrated from this site to Bench Corral feedground from mid-late January, which is prior to the initiation of vaccination activities on Bench Corral or other feedgrounds. Therefore, elk are vaccinated on this feedground but are vaccinated at Bench Corral. In 2014, about 50 elk staged at North Piney and moved to Bench Corral in late December.

RESEARCH –ELK PARTURITION

To document elk abortions and brucellosis transmission event, to facilitate understanding of elk parturition ecology, and in preparation of updating WGFD elk parturition areas, BFH personnel continued research in E106 by deploying vaginal implant transmitters (VITs) in elk attending Jewett (n=2) and Franz (n=2) feedgrounds in 2013. All VITs were recovered; one was from an abortion on the edge of Franz Feedground, and three were associated with live births (Figure 1). Live births occurred in aspen and aspen/sage edge (Jewett) as well as decadent conifer/aspen (Franz). From 2006 through 2013, elk birth sites in EL106 have ranged from willow/riparian areas on private lands to treeline on USFS lands, but have occurred primarily in aspen/conifer habitats on USFS lands (including the Maki prescribed, and Horse Creek and Mule wildfire burn areas). Three of four live births in 2013 were within current WGFD elk parturition areas (Figure 1), and based on all VITs associated with live births in E106 elk from 2006 through 2013, 28% (n =18/65) have occurred within current WGFD elk parturition areas. VIT data from 2006-2013 coupled with GPS collar data from 2008-2013 will be used as elk parturition areas are updated. In 2014, elk from Franz (3), Jewett (1), Bench Corral (4), and Finnegan (3) were fitted with VITs; three of these animals were seropositive and none have aborted as of early June.

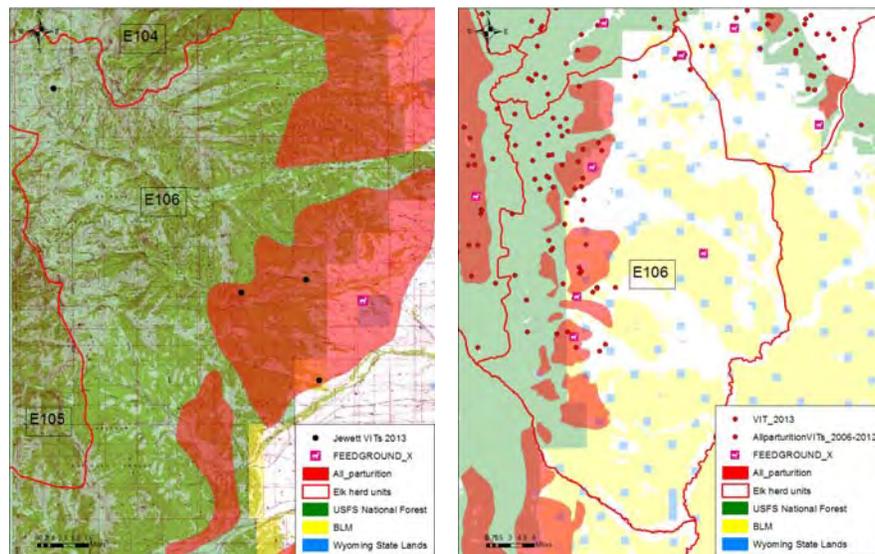


Figure 1. Jewett birth locations and overlap with current elk parturition areas (left), and all E106 birth locations and overlap with current elk parturition areas (right).

RESEARCH/MANAGEMENT – TARGET FEEDGROUND PROJECT

In summer 2007, BFH personnel initiated a project to reduce brucellosis transmission/seroprevalence using novel techniques on feedgrounds with low potential for commingling/damage (Bench Corral, Forest Park, Green River Lakes, Soda Lake, and Fall Creek). Goals of the project were to reduce contacts of elk with aborted fetuses by 1) instituting altered feeding patterns (Low-Density vs. traditional feedline) from early February through end of feeding, 2) attempting to actively (management decision) rather than passively (elk decision)

end feeding, and 3) promoting late-season free-ranging by switching from alfalfa to grass hay (reduced palatability, preference).

In 2012, Low-Density (LD) feeding was incorporated in EL106 on Bench Corral, Jewett, and Franz feedgrounds, occurring from 1 February through end of feeding. At Bench Corral, LD feeding was again enhanced by use of a large tractor and bale-feeder, allowing for precise distribution of hay in multiple rows across the feedground with minimal physical effort on part of the feeder. Feeders at Jewett and Franz initially had good success implementing LD feeding then had to recover following a series of storms in February. However, feeders at Franz and particularly Jewett were able to slowly expand the feeding area and incorporate multiple lines (i.e., 4-8 Franz, 8-16 Jewett) thereafter. Through consistent communication with the Big Piney warden, feedground, and BFH personnel, a favorable long-term forecast, and new feedground compensation plan that uses the long-term end date as a tentative season end-date, feeding at Bench Corral was ended 21 March 2012. This is three days over the average end-date (2000-2013). No attempts were made to use grass hay at the end of the feeding season to encourage elk to free-range from any EL106 feedgrounds. It was reported that around 50 elk briefly attended and departed the North Piney Staging Area in early January, and no damage situations were reported from this migration to Bench Corral.

RESEARCH – USING ELK GPS COLLAR, SWE, HARVEST, AND POPULATION DATA to EDUCATE PUBLIC HUNTERS & INCREASE HARVEST

To help better understand elk movement and distribution during hunting season, increase harvest, and balance the Piney elk herd, BFH personnel used existing elk GPS collar data (n = 38), local snow water equivalent (SWE, n = 4 sites), hunter success, and elk population data to generate maps, figures, and statistics for public presentations in Big Piney and Pinedale. This initiative came from the request and approval of the JN/PE wildlife coordinator, PE supervisor, and administration. Results show that in the last 10 years 1) the Piney herd has been stable but over objective, 2) number of type 6 (cow/calf) tags as well as days to hunt later in the season have increased, 3) SWE is highly correlated with cow/calf harvest, especially in November ($R^2 = 0.67$, Figure 2), 4) elk avoid high-traffic areas (i.e., S. Beaver, N. Horse Roads, Hoback Ranches), and 5) elk shift use from USFS lands in October/November to feedgrounds in December/January (Figure 3). Meetings in Big Piney and Pinedale were attended by 13 and 15 members of the public, respectively. Feedback from the meetings was positive, including several individuals who used the information to hunt and harvest elk.

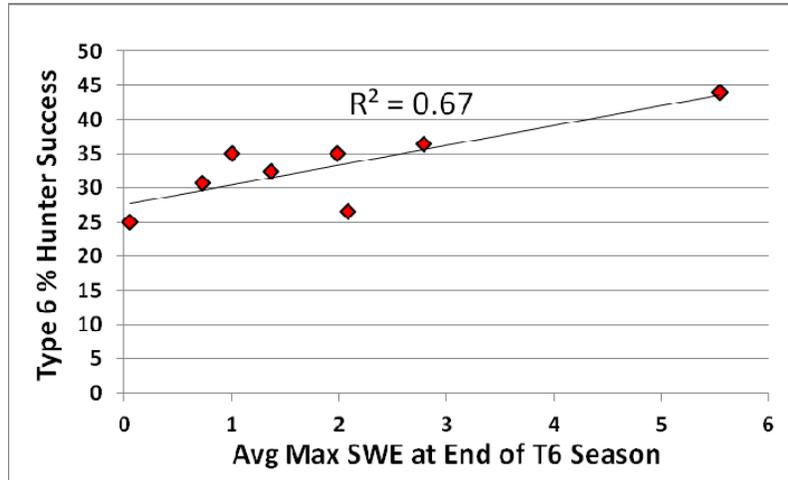


Figure 2. Correlation between Type 6 (cow/calf) tag hunter success and snow water equivalent (SWE) at the end of the Type 6 season.

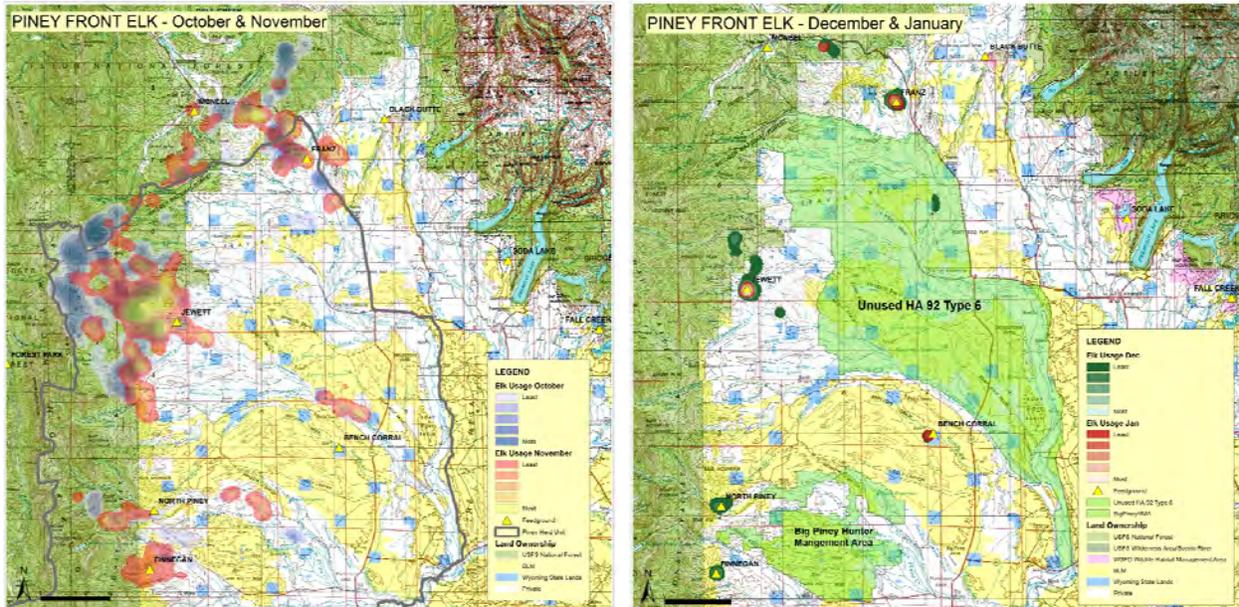


Figure 3. Kernel density estimator maps based on GPS locations of elk during October & November (left) and December & January plus late-season hunt areas (right) in EL106. Isolated locations away from feedgrounds in December & January result from mortalities or collars dropped off of feedgrounds.

BRUCELLOSIS MANAGEMENT (EL107) – 2013

SURVEILLANCE/RESEARCH

Ear tags are permanently affixed to all elk captured and released during brucellosis surveillance and research efforts. Ear tags are recovered when the animal is harvested or a carcass is discovered. This effort aids in our knowledge of elk distribution and facilitates understanding of how brucellosis and other diseases could be spread among herd units. Since 1990, 377 individual elk have been ear tagged in the Upper Green River elk herd unit. About 24% (89) of those tags have been returned, with 85% known to have come from within the herd unit boundary, and 12% known to have come from within 5 different units. The largest amount of interchange appears to be with the Jackson herd unit (Table 1).

Soda Lake Feedground

Five adult female elk were captured via chemical immobilization (1.0ml Carfentanil and 0.5ml Xylazine) on this feedground on January 31, 2014 to either remove GPS collars that failed to drop off automatically as programmed or to outfit with a new GPS collar and Vaginal Implant Transmitter (VIT), and to test for exposure to brucellosis. One elk tested seropositive for brucellosis, but the sample is too small for a significant brucellosis seroprevalence estimate of the feedground population (Table 2). Three GPS collars that were deployed during the previous winter were removed. Two were from Black Butte feed ground and one from the Gros Ventre range's Patrol Cabin feedground. The Patrol Cabin female was of particular interest due to her inter-herd movement and was again outfitted with a new GPS collar, but not with a VIT as the elk was not pregnant at time of recapture. Two other pregnant adult females were captured and outfitted with both a GPS collar and VIT. The GPS collars record a location every 30 minutes for two years and the VITs will be expelled upon either abortion or parturition during late winter/spring of 2014. These efforts are part of region-wide ongoing project to evaluate elk distribution/movement with respect to brucellosis transmission to identify high risk areas. Locations from all GPS collars and VITs (abortion and calving locations) recovered to date for elk captured from this and other feedgrounds within the Upper Green River elk herd unit are illustrated in Figure 1.

Black Butte Feedground

Three females (2 adult, 1 yearling) were captured via chemical immobilization (1.0ml Carfentanil and 0.5ml Xylazine) at this feedground on February 4, 2014. All three were outfitted with GPS collars that record a location every 30 minutes for one year. The two adult females were determined to be pregnant via use of a portable ultrasound and both outfitted with Vaginal Implant Transmitter (VITs) that will be expelled upon either abortion or parturition during late winter/spring of 2014. Locations from all GPS collars and VITs recovered to date for elk captured from this and other feedgrounds within the Upper Green River elk herd unit are illustrated in Figure 1. Although several aborted fetuses have been recovered from this feedground over the years, no abortions have been

documented at Black Butte using VITs. All of the elk tested seronegative for brucellosis in 2014, but the sample of 3 is far too few for a statistically significant brucellosis seroprevalence estimate of the population attending Black Butte feedground (Table 2).

Green River Lakes Feedground

Four adult females were captured via chemical immobilization (1.0ml Carfentanil and 0.5ml Xylazine) on this feedground on February, 25, 2014 and outfitted with GPS collars. All four were determined to be pregnant via portable ultrasound and were also fitted with Vaginal Implant Transmitters (VITs). Locations from all recovered GPS collars and VITs to date for elk captured from this and other feedgrounds within the Upper Green River elk herd unit are illustrated in Figure 1. One of the four elk tested seropositive for brucellosis, but the sample of 5 is too small for a statistically significant brucellosis seroprevalence estimate of the population attending Green River Lakes feedground (Table 2).

One GPS collar that was deployed on the Jewett feedground in 2013 was recovered from the Green River Lakes feedground in early 2014. The GPS data with location fixes taken once every 30 minutes for about a year are displayed in Figure 2. This elk, which had just turned 2 years old in spring 2013, made a dispersal movement from HA92 in the Piney elk herd unit on the morning of June 30th and arrived in HA95 of the Upper Green River herd unit the morning of July 3rd. She was visually observed spending winter 2013-2014 on the Green River Lakes feedground.

Table 1. Distribution of ear tag returns during 2004 to 2013 that were permanently affixed to captured elk in the Pinedale elk herd unit.

UPPER GREEN RIVER ELK HERD UNIT (1993-2013)			
HERD UNIT OF TAG RETURN	# OF TAG RETURNS	% OF TAG RETURNS	% OF ALL TAGGED ELK
UPPER GREEN RIVER	76	85.39%	20.16%
JACKSON	4	4.49%	1.06%
HOBACK	3	3.37%	0.80%
WIGGINS FORK	2	2.25%	0.53%
PINEY	1	1.12%	0.27%
SOUTH WIND RIVER	1	1.12%	0.27%
unknown	2	2.25%	0.53%
Total	n=89	100%	n=377

Table 2. Yearling, adult, and total female seroprevalence of elk on feedgrounds in the Upper Green River elk herd unit based on 4 standard tests and cELISA, 1990-2014.

UPPER GREEN RIVER ELK HERD UNIT										
Feedground	Year	Yearling			Adult			All Females		
		+	<i>n</i>	%	+	<i>n</i>	%	+	<i>n</i>	%
Black Butte	1989*	0	9	0%	4	15	27%	4	24	17%
	2000	1	9	11%	6	25	24%	7	34	21%
	2012*	0	1	0%	0	4	0%	0	5	0%
	2013*	0	0	0%	1	5	20%	1	5	20%
	2014*	0	1	0%	0	2	0%	0	3	0%
	SUM	1	20	5%	11	49	22%	12	68	18%
Green River Lakes	1991*	0	2	0%	3	12	25%	3	14	21%
	1993*	0	1	0%	3	8	38%	3	9	33%
	2003	1	7	14%	5	19	26%	6	26	23%
	2009*	0	0	0%	0	4	0%	0	4	0%
	2011*	0	0	0%	0	5	0%	0	5	0%
	2014*	0	0	0%	1	4	25%	1	4	25%
	SUM	1	10	10%	12	52	23%	12	58	21%
Soda Lake	1988	0	3	0%	12	56	21%	12	59	20%
	1989*	0	4	0%	0	14	0%	0	18	0%
	2006	0	2	0%	5	32	16%	5	34	15%
	2007*	0	0	0%	9	29	31%	9	29	31%
	2008*	0	0	0%	3	5	60%	3	5	60%
	2009*	0	0	0%	12	33	36%	12	33	36%
	2011*	0	0	0%	6	22	27%	6	22	27%
	2014*	0	0	0%	1	5	20%	1	5	20%
	SUM	0	9	0%	48	196	24%	48	205	23%
TOTAL	2	39	5%	71	297	24%	72	331	22%	

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

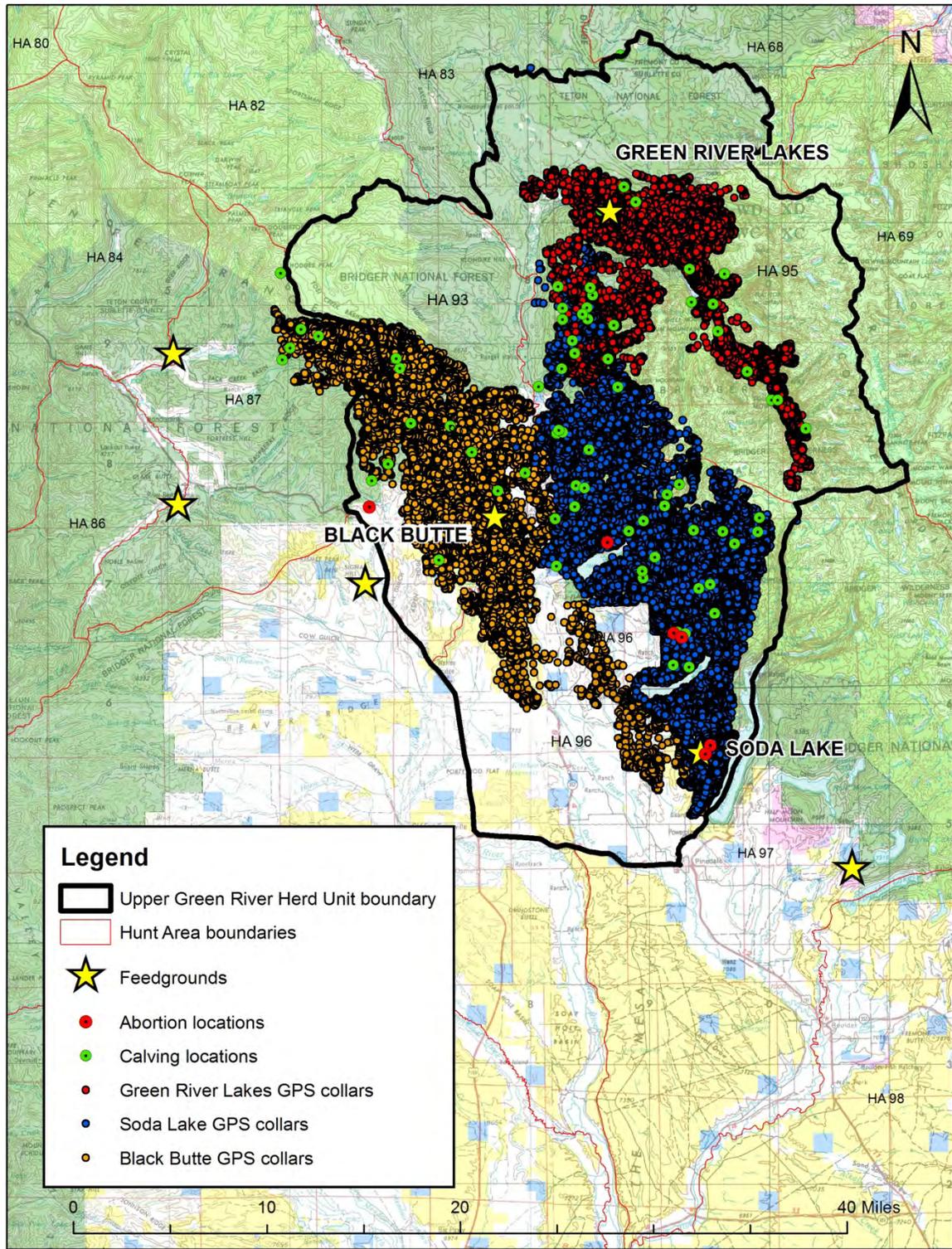


Figure 1. Calving locations based on VIT recovery (bright green circles) and GPS collar locations from all elk captured during winter on Green River Lakes (red), Black Butte (orange), and Soda Lake (blue) feedgrounds, 2008-2013.

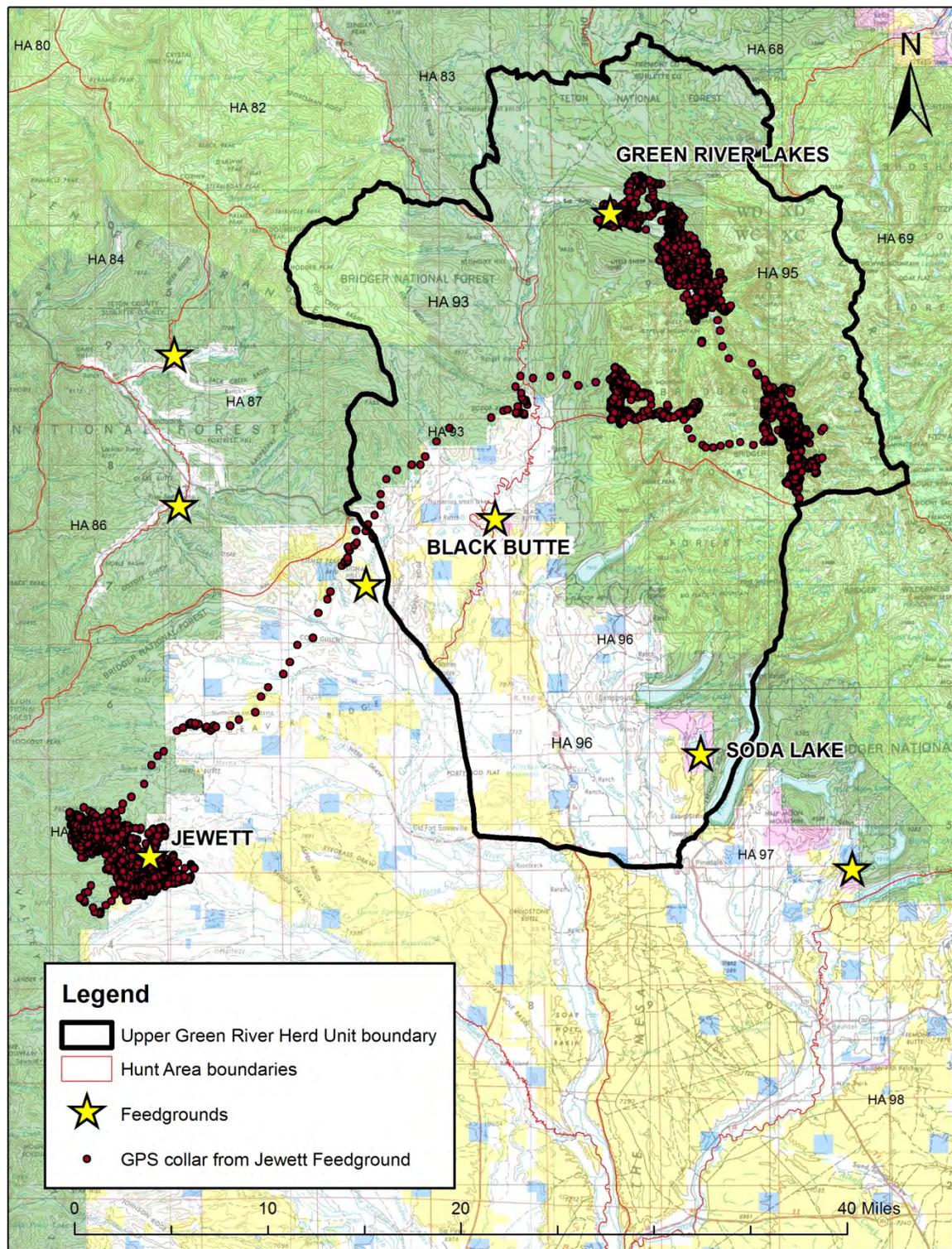


Figure 2. GPS locations for one elk from Jewett feedground that relocated to the Upper Green River herd unit during June 30th to July 3rd of 2013 with location fixes every 30 minutes (red circles).

STRAIN 19 VACCINATION

Soda Lake Feedground

Strain 19 was first administered at this feedground in 1992. There were 270 vaccinated of the 295 juveniles classified on this feedground (92% coverage) over a 15-day period in February. Since 1992, there have been 2,444 juveniles and 821 adult females vaccinated

Black Butte Feedground

Vaccination was completed for the twenty-third consecutive year at this feedground. A total 154 of the 74 classified juveniles (>100% coverage) were vaccinated over a 6-day period in February and March. Since 1989, a total of 4,414 juveniles and 909 adult females have been inoculated.

Green River Lakes Feedground

There were 140 of 155 classified at this feedground this year (>100% coverage). The total vaccine doses administered since the program's initiation at this feedground twenty-eight years ago is 2,555 for juveniles and 1,006 for adult females.

BRUCELLOSIS MANAGEMENT (EL108) – 2013

SURVEILLANCE

Muddy Creek Feedground

The five-year elk Test and Slaughter (T&S) pilot project (2006-2010) was effective at reducing brucellosis seroprevalence among elk at all three feedgrounds in the Pinedale elk herd, most noticeably at the Muddy Creek feedground where seroprevalence fell from 37% to 5% during the years of the project. However, post T&S monitoring efforts in early 2012 indicate that exposure to *Brucella* at Muddy Creek had increased during the 2011 brucellosis transmission season (Feb-June); the first year that slaughter was not conducted. Subsequent trapping efforts have indicated that seroprevalence is continuing to climb. On February 16th, 2014, a total of 142 elk were captured, including 71 different test-eligible (yearling and adult) females, which were bled and tested to reveal 17% (12/71) had been exposed to *Brucella abortus* (Table 1).

Brucellosis testing results subsequent to T&S indicate that the efficacy of the project at reducing brucellosis seroprevalence is ephemeral. T&S did not prevent brucellosis transmission events among elk during the 5 years of the project, as several females seroconverted upon recapture during the project. Prevalence of brucellosis in elk attending feedgrounds where T&S was employed will likely increase to pre-project level.

Scab Creek Feedground

A successful trapping effort was conducted at this feedground on February 22nd. The primary purpose was to continue to evaluate the long-term effect of the pilot T&S project, which occurred on this feedground during two years of the 5-year project (2009, 2010). A total of 140 elk were captured, including 86 test-eligible (yearling and adult) females. A total of 53% (46/86) of elk tested seropositive for the disease (Table 1), which greatly exceeds the 2008 pre-T&S level of 21%.

Fall Creek Feedground

Surveillance at this feedground is conducted on an every other year rotation with the Scab Creek feedground and was not trapped during winter 2013-14. Results from previous year's brucellosis surveillance are included in Table 1. Upon last check in 2013, seroprevalence had risen to 12%, slightly above pre-T&S levels.

Table 1. Yearling, adult, and total female seroprevalence of elk on feedgrounds in the Pinedale elk herd unit based on 4 standard tests and cELISA, 1990-2014.

PINEDALE ELK HERD UNIT										
Feedground	Year	Yearling			Adult			All Females		
		+	<i>n</i>	%	+	<i>n</i>	%	+	<i>n</i>	%
Fall Creek	1994*	1	2	50%	5	12	42%	6	14	43%
	1995*	2	4	50%	9	22	41%	11	26	42%
	2008	2	31	6%	19	160	12%	21	191	11%
	2009	0	13	0%	11	145	8%	11	158	7%
	2011	0	16	0%	3	53	6%	3	69	4%
	2013	0	0	0%	4	34	12%	4	34	12%
	SUM	5	66	8%	51	426	12%	56	492	11%
Muddy Creek	1990*	0	2	0%	4	14	29%	4	16	25%
	1991*	0	5	0%	1	5	20%	1	10	10%
	1996	10	17	59%	19	35	54%	29	52	56%
	1997	3	7	43%	16	31	52%	19	38	50%
	2004*	1	3	33%	3	12	25%	4	15	27%
	2005	0	5	0%	8	25	32%	8	30	27%
	2006	2	10	20%	56	147	38%	58	157	37%
	2007	2	25	8%	11	54	20%	13	79	16%
	2008	1	24	4%	19	134	14%	20	158	13%
	2009	0	13	0%	8	101	8%	8	114	7%
	2010	0	26	0%	7	115	6%	7	141	5%
	2011	0	12	0%	4	60	7%	4	72	6%
	2012	2	19	11%	7	51	14%	9	70	13%
	2013	2	11	18%	7	44	16%	9	55	16%
	2014	1	14	7%	11	57	19%	12	71	17%
SUM	24	193	12%	181	885	20%	205	1078	19%	
Scab Creek	2006*	0	0	0%	3	15	20%	3	15	20%
	2007	0	0	0%	8	38	21%	8	38	21%
	2008*	0	0	0%	1	3	33%	1	3	33%
	2009	3	20	0%	28	129	22%	31	149	21%
	2010	2	21	0%	25	120	21%	27	141	19%
	2012	2	8	0%	19	57	33%	21	65	32%
	2014	1	15		45	71	63%	46	86	53%
	SUM	8	64	0%	129	433	30%	137	497	28%
TOTAL	37	323	11%	361	1744	21%	398	2067	19%	

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

RESEARCH

Fall, Scab, and Muddy Creek Feedgrounds

Ear tags are permanently affixed to all elk captured and released during brucellosis surveillance and research efforts. Ear tags are recovered when the animal is harvested or a carcass is discovered. This effort aids in our knowledge of elk distribution and facilitates our understanding of how brucellosis and other diseases could be spread among herd units. Since 1994, 2,670 individual elk have been ear tagged in the Pinedale elk herd unit. About 15% (395) of those tags have been returned, with 89% known to have come from within the herd unit boundary and 7% known to have come from within 5 different herd units. The largest amount of interchange appears to be with the South Wind River herd unit (Table 2).

During elk captures in 2014, five adult pregnant female elk at Muddy Creek were chemically immobilized and fitted with Vaginal Implant Transmitters (VITs) and VHF radio collars, and 7 adult pregnant female elk at Scab Creek feedground were fitted with VITs and GPS collars, which record a location every 30 minutes for one year. The VITs will be expelled upon either abortion or parturition during late winter/spring 2014, and the GPS collars are programmed to drop off in January 2015 when they will be recovered and the data retrieved. No captures were conducted at Fall Creek in 2014. When combined, these data will build upon ongoing research that began in 2006 with the primary goal of identifying high risk areas for brucellosis transmission. Locations from all recovered GPS collars and VITs to date for elk captured within the Pinedale elk herd unit are illustrated in Figure 1.

Table 2. Distribution of ear tag returns during 2004 to 2013 that were permanently affixed to captured elk in the Pinedale elk herd unit.

PINEDALE ELK HERD UNIT (1994-2013)			
HERD UNIT OF TAG RETURN	# OF TAG RETURNS	% OF TAG RETURNS	% OF ALL TAGGED ELK
PINEDALE	352	89.11%	13.18%
SOUTH WIND RIVER	19	4.81%	0.71%
WIGGINS FORK	5	1.27%	0.19%
UPPER GREEN RIVER	3	0.76%	0.11%
GREEN MOUNTAIN	2	0.51%	0.07%
PINEY	1	0.25%	0.04%
unknown	13	3.29%	0.49%
Total	n=395	100%	n=2670

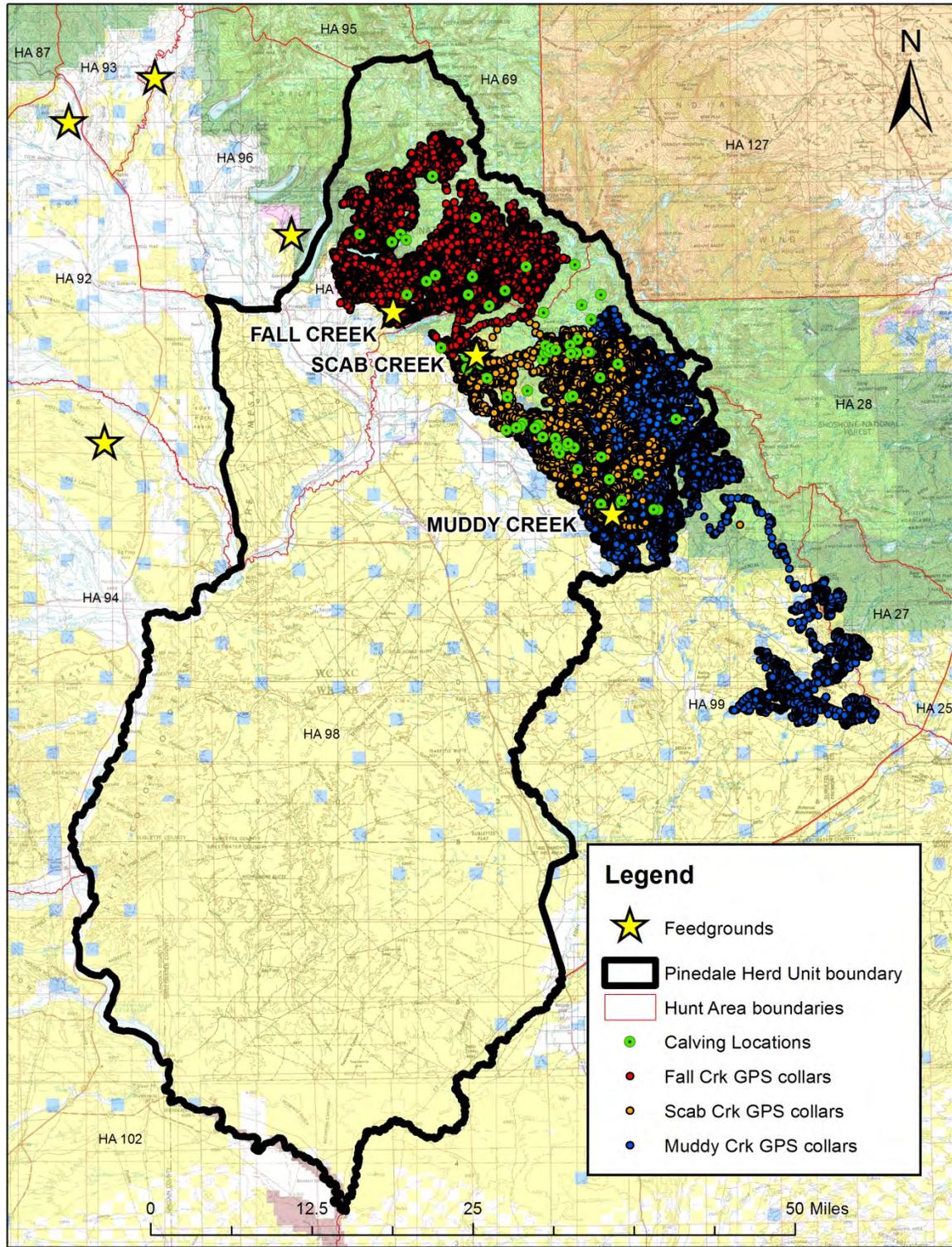


Figure 1. Calving locations based on VIT recovery (bright green circles) and GPS collar locations from all elk captured during winter on Fall Creek (red), Scab Creek (orange), and Muddy Creek (blue) feedgrounds, 2008-2013 (n=31 GPS collars).

STRAIN 19 VACCINATION

Fall, Scab, and Muddy Creek Feedgrounds

Due to the initiation of the pilot T&S project in the Pinedale elk herd unit feedgrounds in 2006, elk have not been vaccinated in effort to reduce the potential for 'false positives', or vaccine reactions, in subsequent T&S trapping or surveillance efforts.