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HNF-65027
Revision 0

Hanford Site Mule Deer Monitoring Report for Fiscal Year 2019

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract 89303320DEM000031

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1.0 INTRODUCTION

1.1 BACKGROUND

The U.S. Department of Energy, Richland Operations Office (DOE-RL) conducts ecological monitoring on the Hanford Site to collect and track data needed to ensure compliance with environmental laws, regulations, and policies governing Department of Energy activities. Ecological monitoring data provide baseline information about the plants, animals, and habitats under DOE-RL stewardship at the Hanford Site required for decision-making under the *National Environmental Policy Act of 1969* (NEPA) and *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*. The Hanford Site Comprehensive Land Use Plan (CLUP, DOE 1999), which is the Environmental Impact Statement that evaluates the potential environmental impacts associated with implementing a comprehensive land-use plan for the Hanford Site, ensures that DOE-RL, its contractors, and other entities conduct activities on the Hanford Site in compliance with NEPA.

The vision for the DOE-RL-managed portion of the Hanford Site focuses not only on the cleanup of nuclear facilities and waste sites but on the protection of groundwater and the Columbia River, as well as protection and restoration of the Hanford Site lands. To reach these goals the Hanford Site is working closely with partners (e.g., the U. S. Fish and Wildlife Service and National Park Service) to enable use of the Hanford Site land consistent with the CLUP. As the Hanford Site moves toward accomplishing this vision, understanding of the ecological resources present and the need for conservation and/or protection of those resources will be critical for making informed decisions for responsible site stewardship.

1.2 MULE DEER SURVEYS ON THE HANFORD SITE

Population characteristics of mule deer (*Odocoileus hemionus*) on the Hanford Site have been monitored since 1994. Roadside surveys have been conducted during the post-hunting period from mid-December to January to assess age and sex ratios, and the frequency of testicular atrophy in males. Although hunting is not permitted on the Hanford Site, wildlife can enter and leave freely. Due to this movement, surveys are conducted after deer hunting season has ended, which runs from September through early December. Additionally, during the winter months following the fall rut, deer tend to herd into tighter groups, greatly easing monitoring efforts.

Prior to fiscal year (FY) 2003, variable numbers of surveys were performed each year. Between FY 2003 and FY 2009, five surveys were conducted during each post-hunt period. This was reduced to three surveys in FY 2010 and 2011. No surveys were conducted in FY 2012. Since FY 2013, three surveys have been performed every 3 years. During each survey, individual animals were identified according to sex and age class (fawn or adult). For male deer, the presence of misshapen, velvet-covered antlers was used as an indicator of testicular atrophy. This report documents historical trends from past surveys and compares the current year to the two most recent surveys in FY 2016 (HNF-60304) and FY 2013 (HNF-55551).

Trends in the ratios of fawns to does over time can be used to monitor changes in mule deer population size and health. Mule deer populations provide a rough indication of overall habitat quality. Additionally, mule deer are a trustee resource of interest and importance to wildlife resource agencies and local Tribes.

In FY 2016, the last time data was collected, the fawn-to-doe mean estimate was 46.4 fawns per 100 does for the northern region and 29.6 fawns per 100 does for the southern region. The northern region ratio was slightly higher and the southern slightly lower than previously recorded in FY 2013, while the running 10-year averages for both regions remained quite steady. The fairly consistent trend in fawn-to-doe ratios suggests that, previously, mule deer populations have remained stable onsite (HNF-60304; PNNL 20548). Hanford Site fawn-to-doe ratios for all survey years (1994 through 2019) are weighted averages, using the total number of fawns and does seen per survey as the weighting factor. This report will address current fawn-to-doe findings for the 15-year average between FY 2005 and 2019.

In the early 1990s, testicular atrophy and sterility were observed in some male mule deer on the Hanford Site. Extensive investigation found no relationships between the presence of testicular atrophy and contaminant levels, diet, disease, or natural conditions (e.g., aging or genetics) (PNNL-11518). Testicular atrophy in male mule deer is associated with abnormal antler growth manifested as misshapen, velvet-covered antlers, which can be observed in field surveys. The observed frequency of misshapen antlers in mule deer has ranged from a high of 17% in the southern region in 1998 to a low of 0% in both regions in 2003. Observations of affected male deer have been low; the observed frequency of antler abnormality in the northern region was 3.9% in 2011, 0% in 2013, and 4.5% in 2016. In the southern region, observed frequency of antler abnormality was 0% in 2011, 4.8% in 2013, and 3.7% in 2016. These frequencies need to be interpreted with caution because the small sample sizes may not fully reflect population conditions; however, recent data indicate the health of the male mule deer on the Hanford Site has not changed substantially over the last decade.

Rocky Mountain Elk (*Cervus elaphus*) data (locations, gender, and herd counts) was collected while deer surveys were conducted. It was not until 1972 when elk were first documented on the Hanford Site, and in recent years the population has grown drastically. These surveys provide a valuable opportunity to document areas regularly occupied by elk and the status of population. While roadside surveys may not represent a dependable long-term survey methodology, these observations may be sufficient to maintain an ongoing record of the relative abundance of elk on the central Hanford Site.

2.0 METHODS

The FY 2019 northern and southern driving routes were each surveyed four times during the post-hunting period from December 2018 to January 2019 (Table 1). Both regions were surveyed on December 13, 2018, and January 17 and 29, 2019. Additionally, the northern region was surveyed on December 26, 2018, and the southern region was surveyed on December 27, 2018, due to staffing limitations that prevented the surveys from occurring on the same day.

Surveys were conducted from a vehicle along a specified route (Figure 1). The route is approximately 37 mi (60 km) long; the northern end of the route is near 100-B/C, the southern end is just north of the 300 Area. The survey route is divided into a northern region and a southern region, with the break occurring at the north end of the Hanford Townsite. Surveys begin at dawn or mid-afternoon (to end near dusk) and are driven alternatively from north-to-south and south-to-north. Deer and elk are most active during early morning and late evening. Therefore, to attain maximum sample sizes and help attain representative estimates for these population characteristics, surveys were performed within 4 hours of twilight and dusk, when deer and elk were most likely to be active.

Two staff conducted each survey - the driver and a second observer. Survey speed was 5 to 35 mi/hr (8 to 56 km/hr) with higher speeds on the Hanford Site primary roads and slower speeds on the secondary and dirt roads. When deer were spotted, the driver stopped and/or pulled off the road. The odometer reading was recorded, a global positioning system position was collected, and the distance and direction from the observation point were collected with a laser range finder and compass. Specific data collected about the herd included the number of deer, their sex and age class, and the presence of misshapen antlers on any of the bucks. Care was taken to avoid duplicate counts of the same deer. Similar data were collected for elk observed along the driving transects.

Over the four sample dates, surveys were conducted such that each half-transect was surveyed during both the morning and afternoon and travelled in both directions (Table 1). To the extent possible, this should have reduced bias that may occur because of time of day.

Table 1. Matrix of Survey Times and Travel Directions by Route and Survey Date.

Date	Route	Survey Period	Survey Direction
December 13, 2018	Southern	Morning	South-to-North
December 13, 2018	Northern	Morning	South-to-North
December 26, 2018	Southern	Evening	South-to-North
December 27, 2018	Northern	Evening	South-to-North
January 17, 2019	Northern	Morning	North-to-South
January 17, 2019	Southern	Morning	North-to-South
January 29, 2019	Northern	Evening	North-to-South
January 29, 2019	Southern	Evening	North-to-South

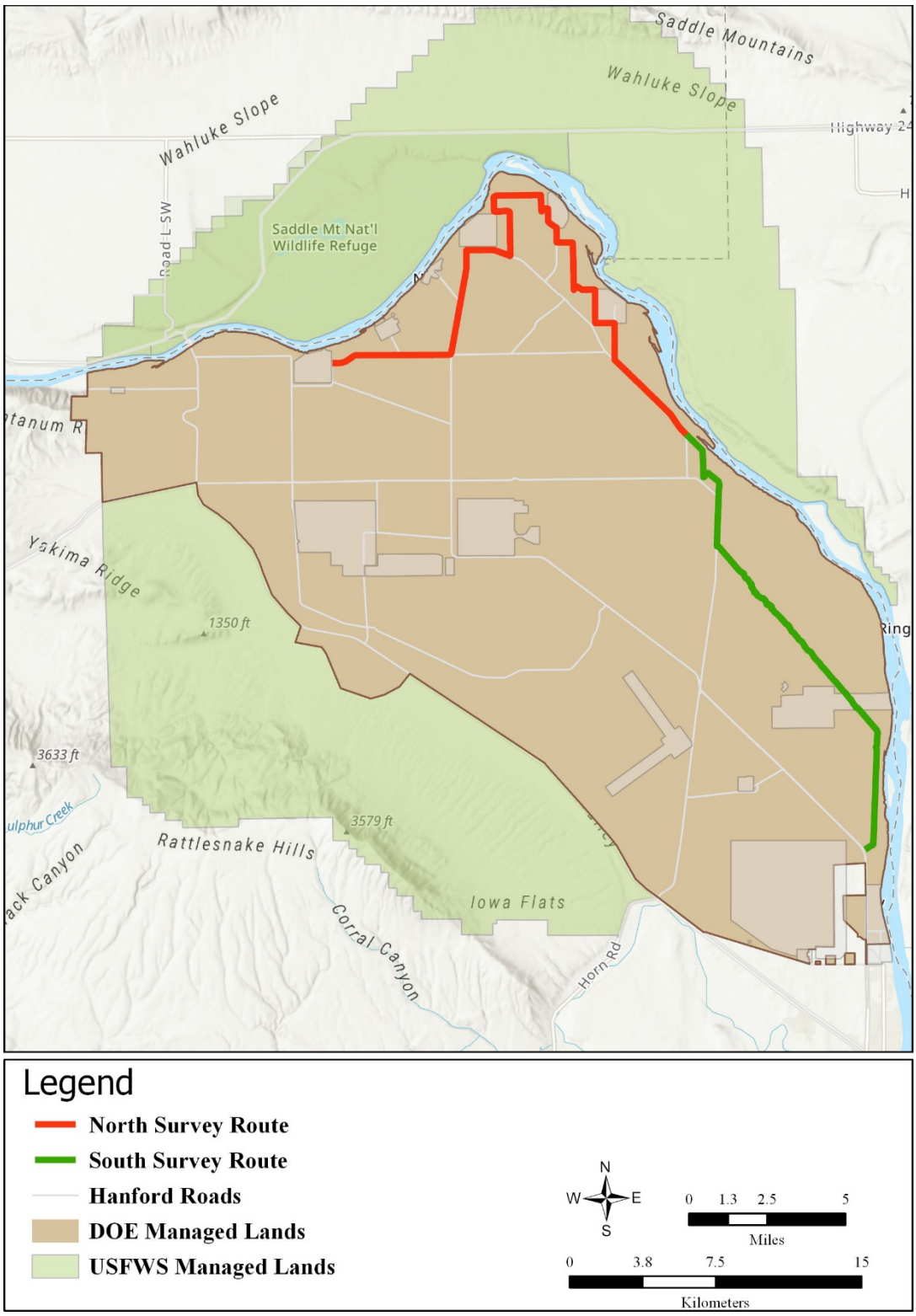

Figure 1. Northern and Southern Region Driving Routes for FY 2019 Hanford Site Mule Deer Surveys

3.0 RESULTS AND DISCUSSION

3.1 MULE DEER

Over the five survey dates, 206 mule deer were counted (Table 2). Total observations were relatively equal between regions with 43.2% in the southern region and 56.8% in the northern region; however, there were three times more bucks observed in the southern region than the northern region. Combined, bucks accounted for 7.8% of observations, which is down from 19.1% in 2016 and 14.8% in 2013. There were almost twice as many fawns observed in the northern region than the southern region. In the combined regions, fawns accounted for 38.8% of observations, up from 20.6% in 2016 and 21.2% in 2013.

Table 2. Mule Deer Survey Results for FY 2019.

Region / Date	Bucks	Does	Fawns	Antlerless[a]	Total
Northern Region:					
December 13, 2018	0	6	6	0	12
December 27, 2018	2	21	9	0	32
January 17, 2019	2	7	8	0	17
January 29, 2019	0	26	30	0	56
Total - North	**4**	**60**	**53**	**0**	**117**
Southern Region:					
December 13, 2018	5	13	6	3	27
December 26, 2018	3	17	12	0	32
January 17, 2019	2	2	0	0	4
January 29, 2019	2	11	9	4	26
Total – South	**12**	**43**	**27**	**7**	**89**
Combined:					
December 13, 2018	5	19	12	3	39
December 26-27, 2018	5	38	21	0	64
January 17, 2019[b]	4	9	8	0	21
January 29, 2019	2	37	39	4	82
Total Combined	**16**	**103**	**80**	**7**	**206**

[a] Antlerless are either fawns or does, but age could not be accurately determined.
[b] Inclement weather may have impacted survey numbers on this day.

The number of mule deer observed in the northern region averaged 29.3 (± 19.8) deer in FY 2019. In the southern region, there was an average of 22.3 (± 12.4) deer surveyed. When combining daily counts from both regions in FY 2019, the average number of mule deer was 51.5 (± 26.9), with a range of 21 to 82 deer observed (Figure 2). This average is similar to averages calculated since data collection started in 1995 and the 95% confidence interval falls within the range of the confidence intervals for all other

recorded survey years, indicating that the average from FY 2019 is not statistically different than previous years (Figure 2). The wide confidence interval associated with the averages is likely due to a variety of factors including imperfect detection and immigration/emigration of deer in the survey areas. Increasing the number of surveys could tighten the confidence interval and provide a better assessment of changes in deer numbers over time.

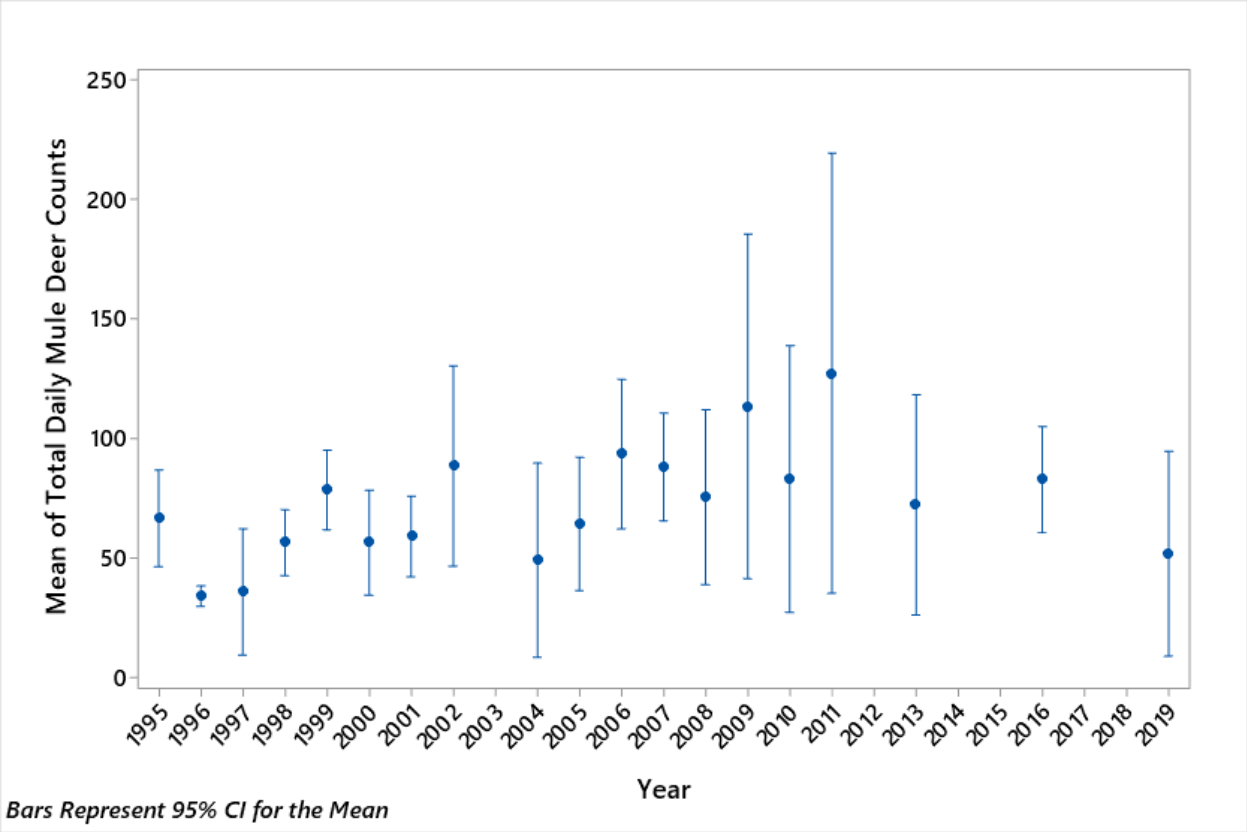

Figure 2. Average Number of Deer Observed in Both Regions FY 1995 to FY 2019

The largest concentrations of mule deer were observed in the northern region between 100-D/DR and 100-H, with additional clusters between 100-N and 100-D/DR and between 100-H and 100-F (Figure 3). The southern region had smaller clusters of deer and were mostly observed in the immediate vicinity of the Hanford Townsite. There were no deer observed in the northern region between 100-B/C and 100-N, and very few between the southern end of the Hanford Townsite and Energy Northwest in the southern region.

Deer & Elk Observations December 2018 - January 2019

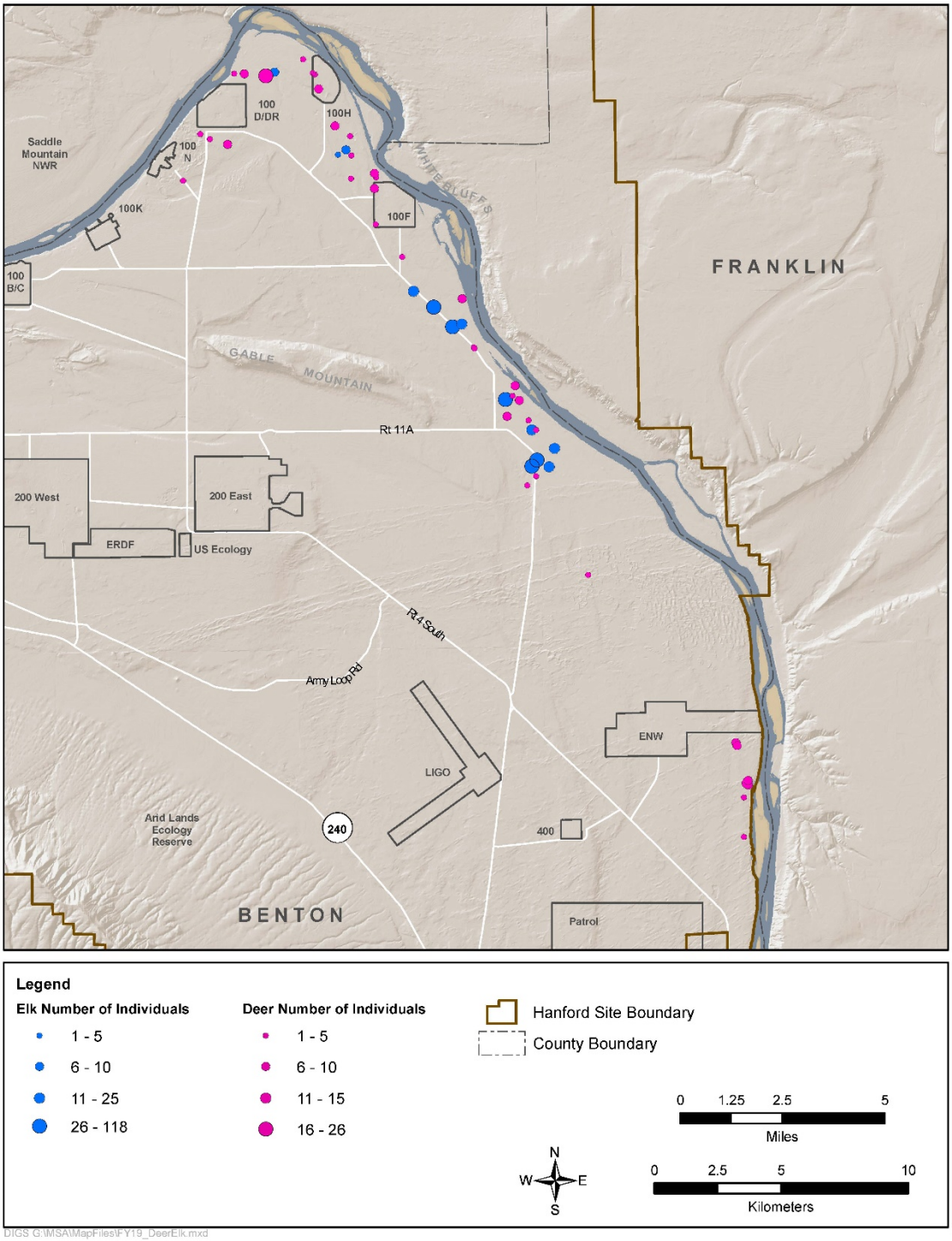

Figure 3. Distribution of Observed Mule Deer and Incidental Elk Herds During FY 2019

The number of fawns per 100 does in FY 2019 was estimated to be 94.4 (±22.9) in the northern region and 65.2 (±12.8) in the southern region. Although the yearly ratio of fawns per 100 does has varied, the running 10-year average has largely remained consistent with the exception of a sharp increase in FY 2019 (Figure 4).

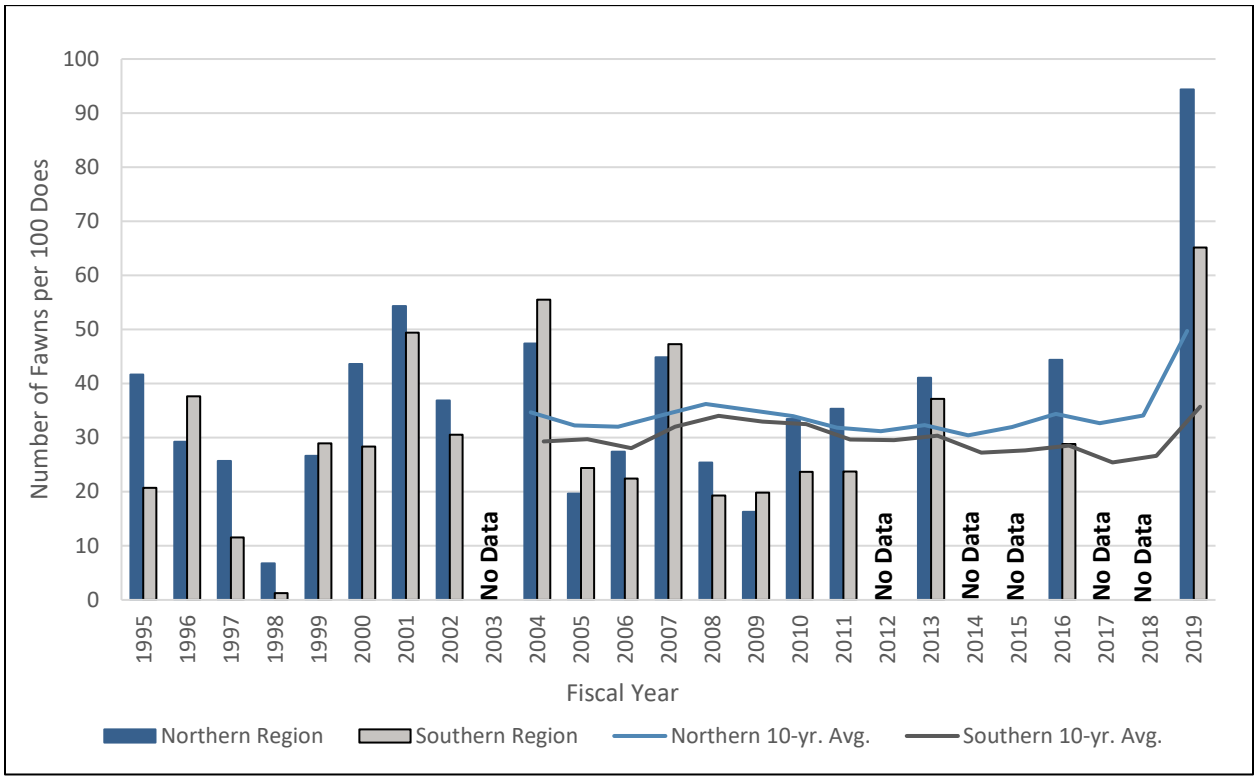

Figure 4. Ratio of Fawns to Does in each Region FY 1995 to FY 2019

There were no deer observed with abnormal antler growth in FY 2019. Historical percentage values of observed bucks with abnormal antler grow are documented in Figure 5, which shows that observations have remained around 3 to 4% since 2011. The 10-year rolling average was also 3 to 4% since 2009.

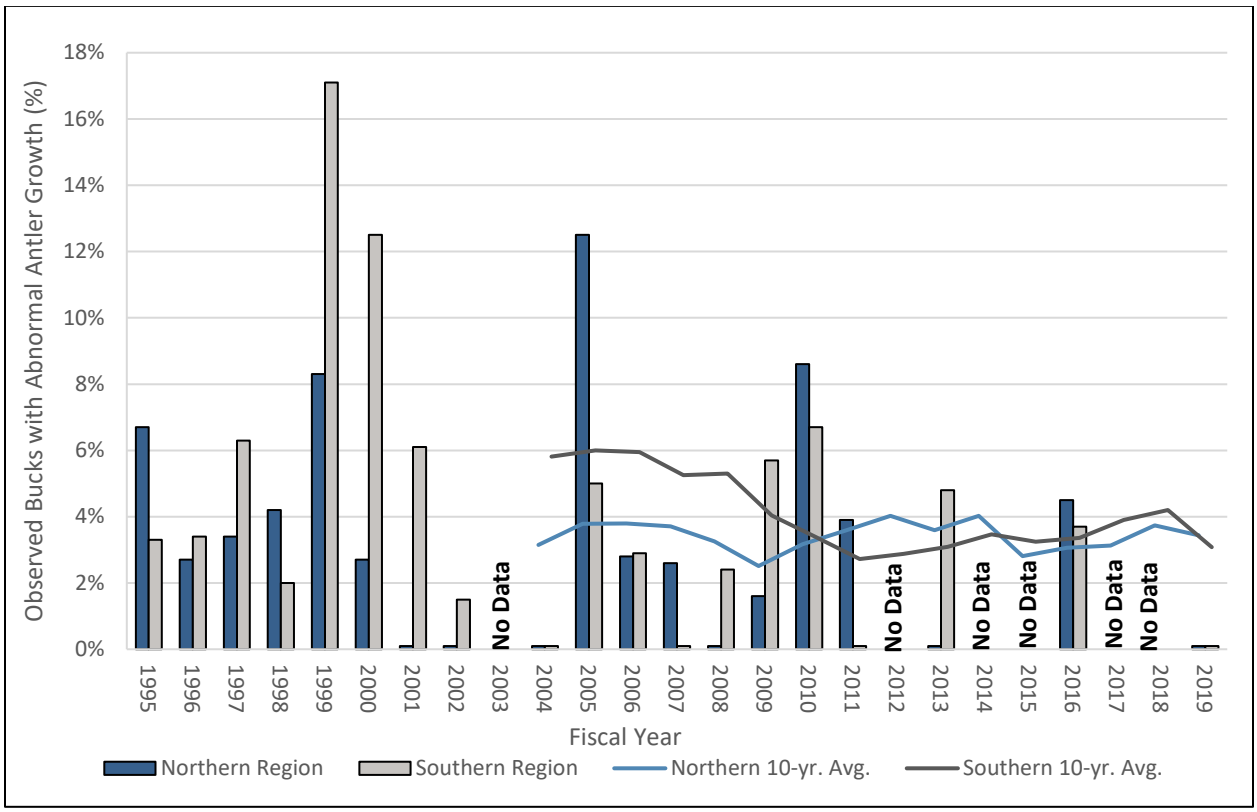

Figure 5. Percentage of Bucks with Abnormal Antler Growth, FY 1995 through FY 2019

3.2 INCIDENTAL ELK POPULATIONS

Elk were observed during all four surveys in the northern region and the December 27, 2018, and January 17, 2019, surveys in the southern region. A group of bull elk consisting of seven individuals (referred to as the "Bachelor's") were observed during the December 26, 2018, and January 17, 2019, northern region surveys. They were spotted each time just north of 100-D/DR and 100-H Areas. A large herd of elk consisting of approximately 118 individuals were observed between the Hanford Townsite and the 100-F Reactor Road during the January 29, 2019, survey, while a smaller herd of approximately 45 individuals were observed approximately 0.62 mi (1 km) north along Route 2 North. The size of elk herds observed on the Hanford Site during deer surveys has grown in recent years. The herd of 118 individuals observed this year was up from 77 and 39 observed in 2016 and 2013, respectively.

Further monitoring information on the Hanford Site elk herd is located in Mission Support Alliance's HNF-54666, *Elk Monitoring Report for Calendar Year 2012*.

4.0 SUMMARY

The monitoring conducted during FY 2019 found the average number of mule deer was similar to previous years. The fawn-to-doe average has remained fairly consistent over the last 10 years; however, a sharp ratio increase was observed in FY 2019 (Figure 4) due to a decrease in does observed in FY 2019 compared to FY 2016 (46.9% decrease in southern region, 47.8% decrease in northern region [HNF-60304]). The number of fawns observed in the northern region (53; Table 2) did not notably differ from what was observed in FY 2016 and 2013 (51 and 45, respectively). However, the number of fawns observed in the southern region (27; Table 2) was notably higher than what was observed in FY 2016 and 2013 (17 and 16, respectively). There were zero observations of misshapen antlers in FY 2019, below the 10-year average that hovers around 3 to 4% (Figure 5).

The current management goal for both mule deer and elk on the Hanford Site is conservation. With a growing elk population competing for the same resources, future monitoring data could be analyzed to track the population trends between the two species. Information from continued deer monitoring surveys may aid future game-management decisions.

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