Annual Interim Report: F19AP00849 Ungulate Movements and Spatial Ecology in Montana
Reporting Period: October 1, 2019 – September 30, 2020
State: Montana
Agency: Montana Fish, Wildlife and Parks

Background and Purpose

In 2019, Montana Fish, Wildlife and Parks (MFWP) Statewide and Regional Wildlife Program Managers identified two priority ungulate populations where movement data were needed to inform ungulate habitat management. The purpose of this project is to collect ungulate movement data in these two populations, the Devils Kitchen elk and Carbon County mule deer. This information will inform ungulate habitat and management decisions, and enhance the management of Montana's ungulate populations, their habitats, and the public's opportunity to enjoy them.

The primary information need for elk in the Devil's Kitchen area is to delineate current seasonal ranges and movement corridors, and document elk movements during the hunting seasons. The elk population far exceeds numerical population objectives, and recent observations regarding changing elk distributions and timing of seasonal movements has resulted in local conflict and controversy, challenging the community's ability to develop effective harvest and habitat management strategies. Recent elk GPS movement data do not exist in this area, and the only existing movement data are from VHF collars deployed in 1990, making decisions regarding elk habitat and harvest management challenging. Fine-scale location data will identify important seasonal habitats and movement corridors, as well as provide information regarding the timing of movements to refine harvest management strategies that maximize the effectiveness of harvest regulations in achieving harvest objectives in this area.

The primary information need for mule deer in Carbon County is to delineate current seasonal ranges and movement corridors, identify connections between this population and adjacent mule deer populations, and to better inform conservation and management of mule deer in this area. The recent detection of Chronic Wasting Disease (CWD) in the southern Carbon County area raises questions about movement patterns of mule deer in this area. No telemetry data have ever been collected for mule deer in this area, and seasonal observations of deer numbers suggest that a portion of the population is migratory. While summer ranges of these deer are unknown, local knowledge suggests that some of these deer migrate south into Wyoming where mule deer herds are infected with CWD, north into areas with higher-density, uninfected populations of mule deer and white-tailed deer in Montana, and west into higher-elevation areas in or near Yellowstone National Park (YNP). With an emphasis on reducing the spread of CWD, it is important to understand the movement patterns of these mule deer, and how their movements overlap with adjacent infected mule deer populations in Wyoming and presumably uninfected mule deer populations in Montana. Seasonal location and movement data will contribute to our knowledge of the potential avenues for CWD spread across this region of Montana and Wyoming.

Specific goals for this reporting period include:

1. Capture and collar 50 elk in the Devil's Kitchen and initiate elk movement data collection.
2. Capture and collar 40 mule deer in southern Carbon County and initiate mule deer movement data collection.

Location
The Devils Kitchen elk data collection is occurring in Cascade and Meagher Counties and the Carbon Country mule deer data is being collected in Carbon County, Montana.

Objective 1: ***Capture and collar 50 elk in the Devil's Kitchen and initiate elk movement data collection*****.**

We used a combination of helicopter netgunning and chemical immobilization to capture 50 female elk in the Devil's Kitchen study area during February 2020. We collected a blood sample to test for pregnancy and for disease surveillance and we collected a tooth for aging animals. Blood serum was obtained from 49 of 50 elk. We estimated a pregnancy rate of 88% (n=49). Serum was tested for antibodies to a panel of infectious agents including *Brucella abortus*, Bovine Herpes Virus (BHV-1 aka IBR), Anaplasmosis, Epizootic Hemorrhagic Disease (EHD), Bluetongue Virus (BTV), Parainfluenza-3 (PI3), Leptospirosis (5 serovars), Bovine Respiratory Syncytial Virus (BRSV), and Bovine Viral Diarrhea I and II (BVD I and II). A positive result on these serological tests indicates exposure to an infectious agent but does not confirm infection status. All elk tested negative for exposure to *Brucella abortus*. Results from serological testing were generally similar to other herds in Montana. None of the elk tested had evidence of exposure to BTV, BRSV, or BVD I and II. Elk showed evidence of exposure to BHV (n=1, 2.0%), Anaplasmosis (n=40, 81.6%), EHD (n=1,2.0%), Leptospirosis (n=3, 6.1%) and Parainfluenza-3 (n=48, 98.0%). Exposure to Anaplasmosis and PI3 is quite variable among elk herds in Montana, but high seroprevalence is not uncommon. Elk ages ranged from 1.5 to 17.5 and the average age was 6.5.

Each elk was outfitted with a Lotek LiteTrack collar programmed to collect hourly locations for 3 years. Location data are uploaded daily through the Iridium satellite service. Collars transmit a mortality notice if the collar is stationary for more than 6 hours. To date, one animal died shortly after capture of capture related, 3 collars have malfunctioned, and 46 collars are actively collecting location data. We have collected a total of 230,913 GPS locations (Figure 1). The core of the elk winter range was located on the Beartooth Wildlife Management Area and nearby private ranchlands (Figure 2). In spring (Figure 3) and summer (Figure 4), elk dispersed eastward to summer ranges. During early fall (i.e., until this reporting period ended October 1), most elk have remained nearby their summer ranges (Figure 5).

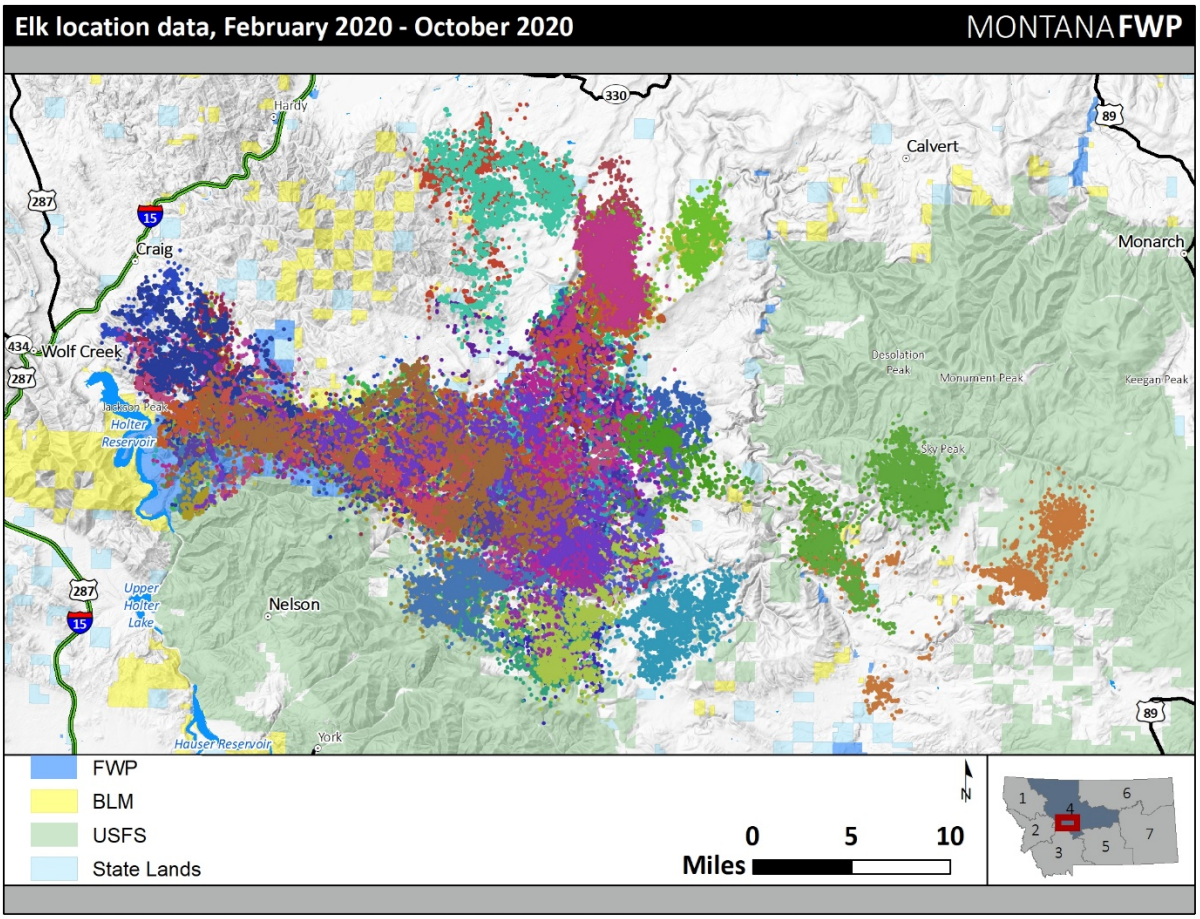

Figure 1. Location data collected from 49 collared female elk in the Devil's Kitchen area northeast of Helena, MT.

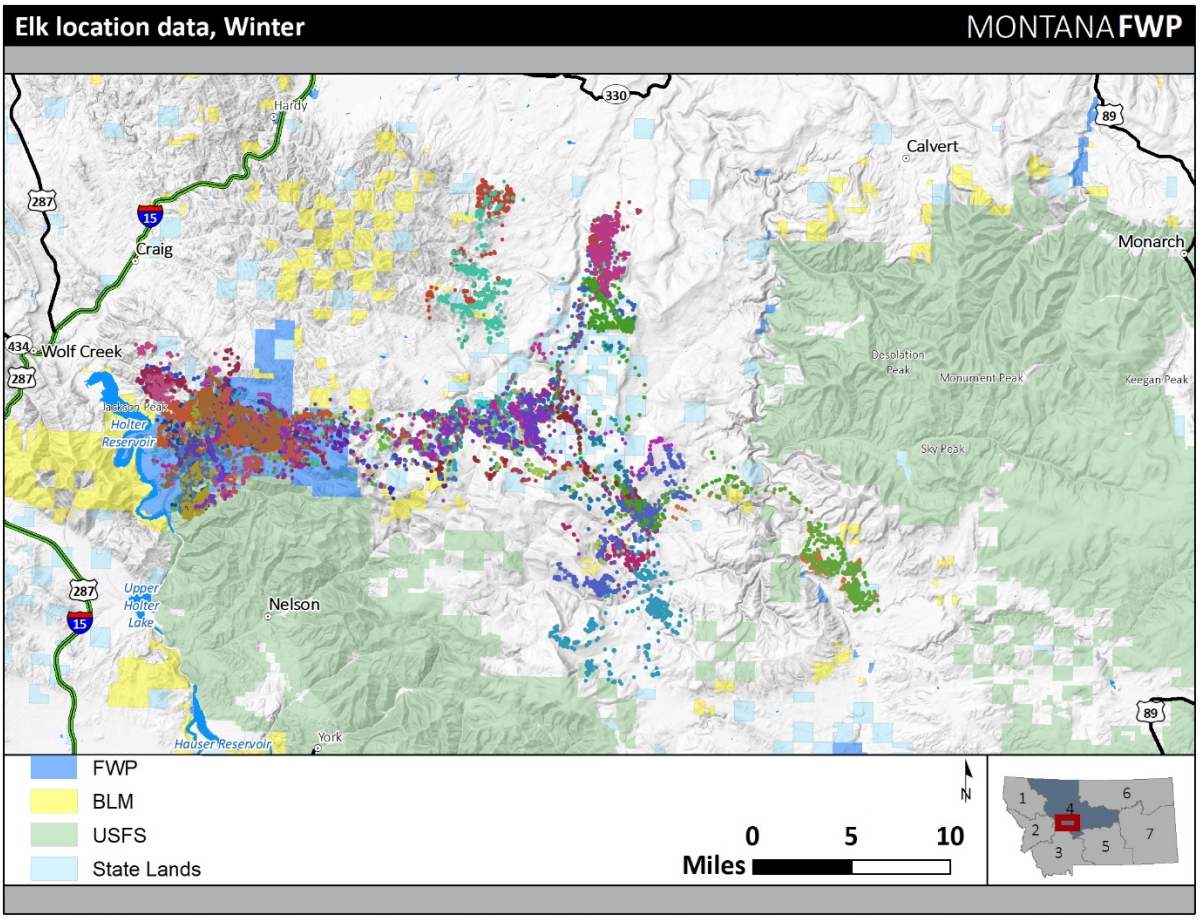

Figure 2. Winter (February- 31 March 2020) location data collected from collared female elk in the Devil's Kitchen area northeast of Helena, MT.

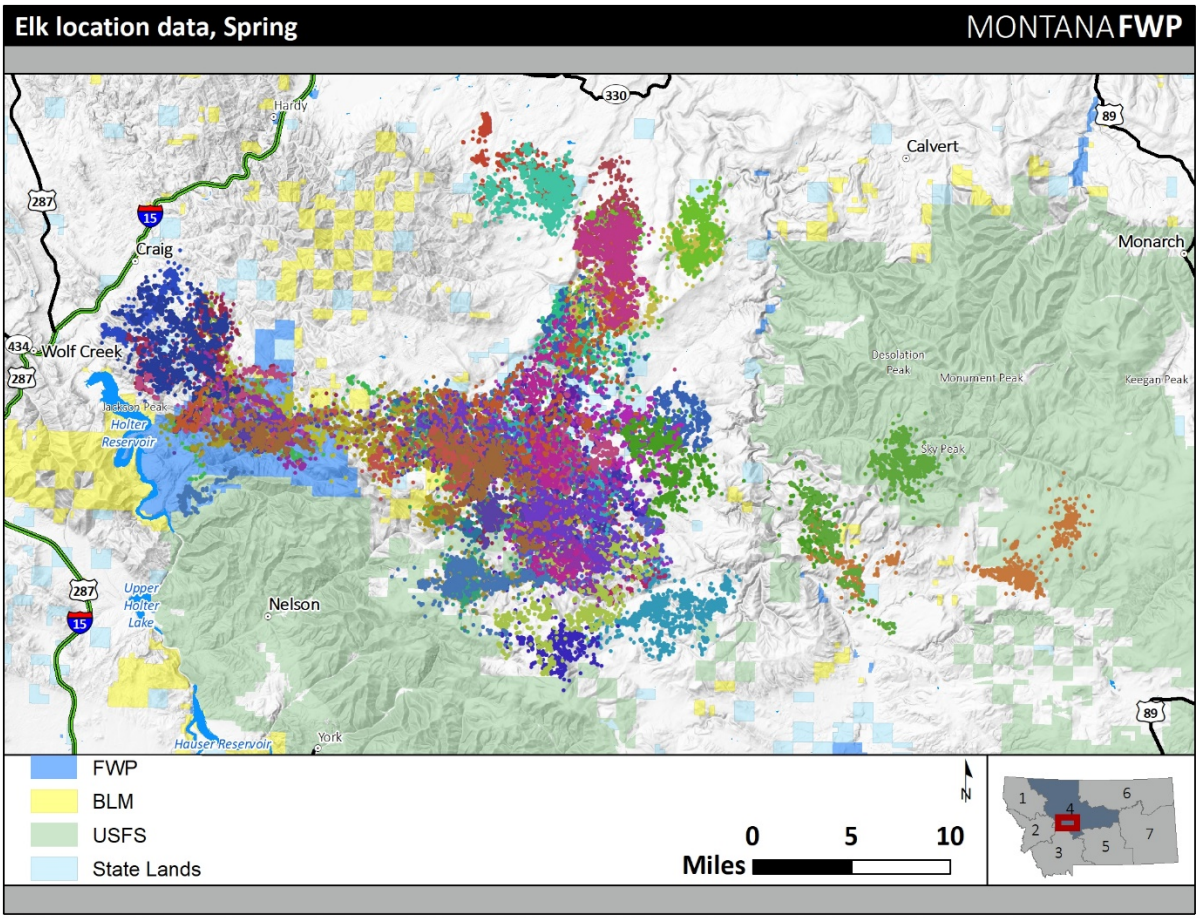

Figure 3. Spring (01 April – 30 June, 2020) location data collected from collared female elk in the Devil's Kitchen area northeast of Helena, MT.

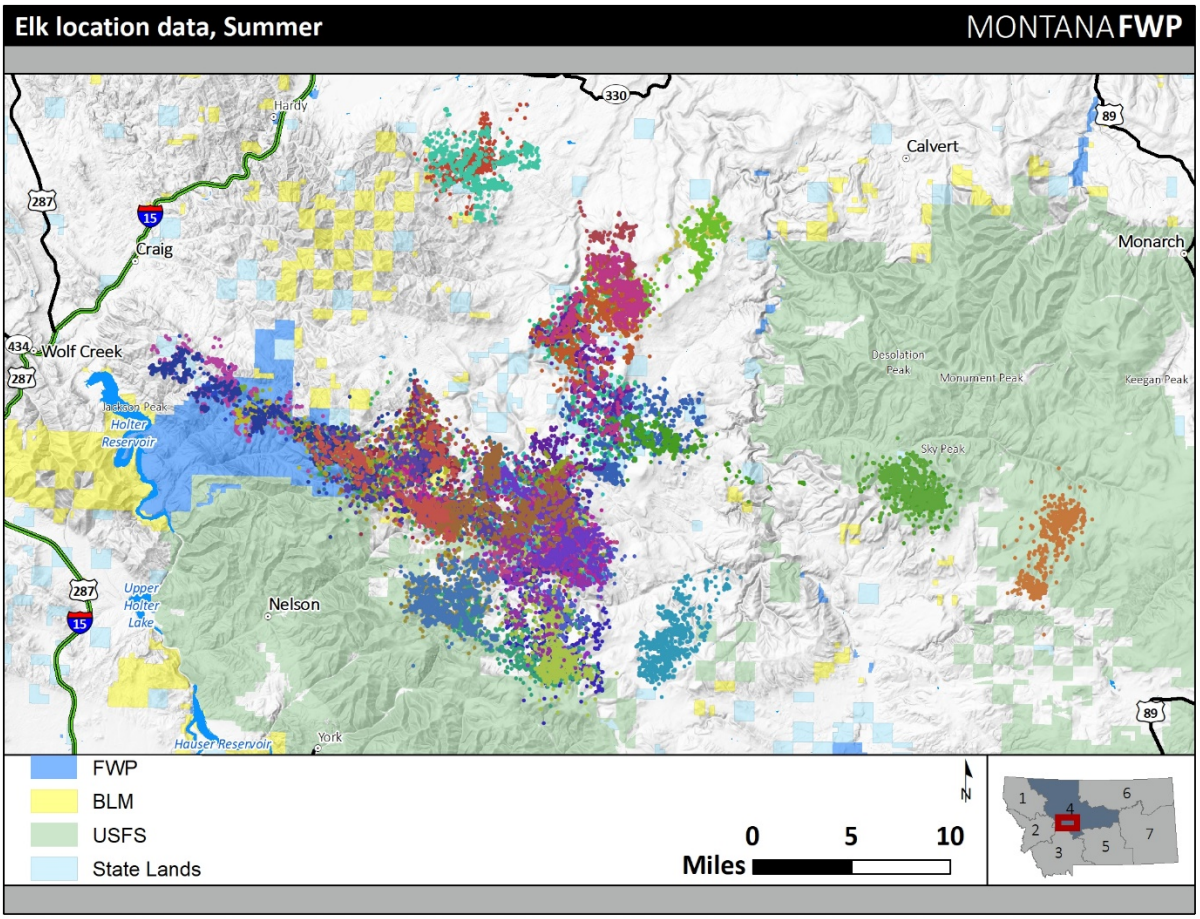

Figure 4. Summer (01 July- August 31, 2020) location data collected from collared female elk in the Devil's Kitchen area northeast of Helena, MT.

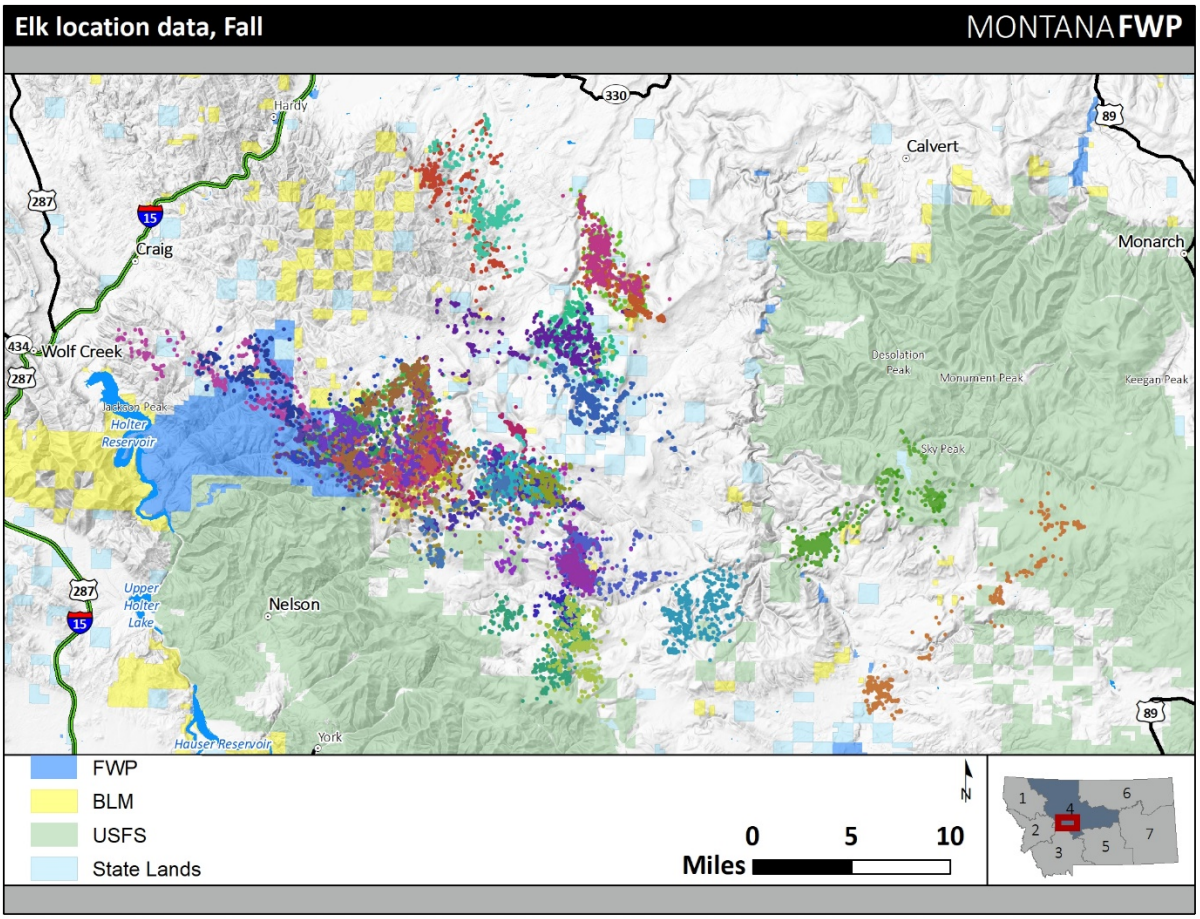

Figure 5. Fall (01 September – 01 October, 2020) location data collected from collared female elk in the Devil's Kitchen area northeast of Helena, MT.

During the monitoring period, the majority of elk locations occurred on private lands and the proportion of all elk locations on privately owned lands was 0.70. Elk locations also occurred on Bureau of Land Management (ppn =0.01), US Forest Service (ppn =0.05), Montana State Trust (ppn =0.06), and FWP lands (ppn =0.16). Use of different landownerships varied by season (Table 1). The degree of private land use also varied by individual (Figure 6).

Table 1. The proportion of seasonal elk locations occurring on private lands and public lands managed by the Bureau of Land Management (BLM), US Forest Service (USFS), Montana State Trust, and Montana Fish, Wildlife, and Parks (FWP).

	Winter (1 Feb – 31 Mar)	Spring (1 Apr – 30 Jun)	Summer (1 July – 31 Aug)	Fall (Sept 1- Oct 1)
FWP	0.50	0.12	0.07	0.07
State Trust	0.04	0.07	0.07	0.11
Private	0.41	0.77	0.75	0.76
BLM	0.01	0.01	0.02	0.03
USFS	0.04	0.03	0.08	0.03

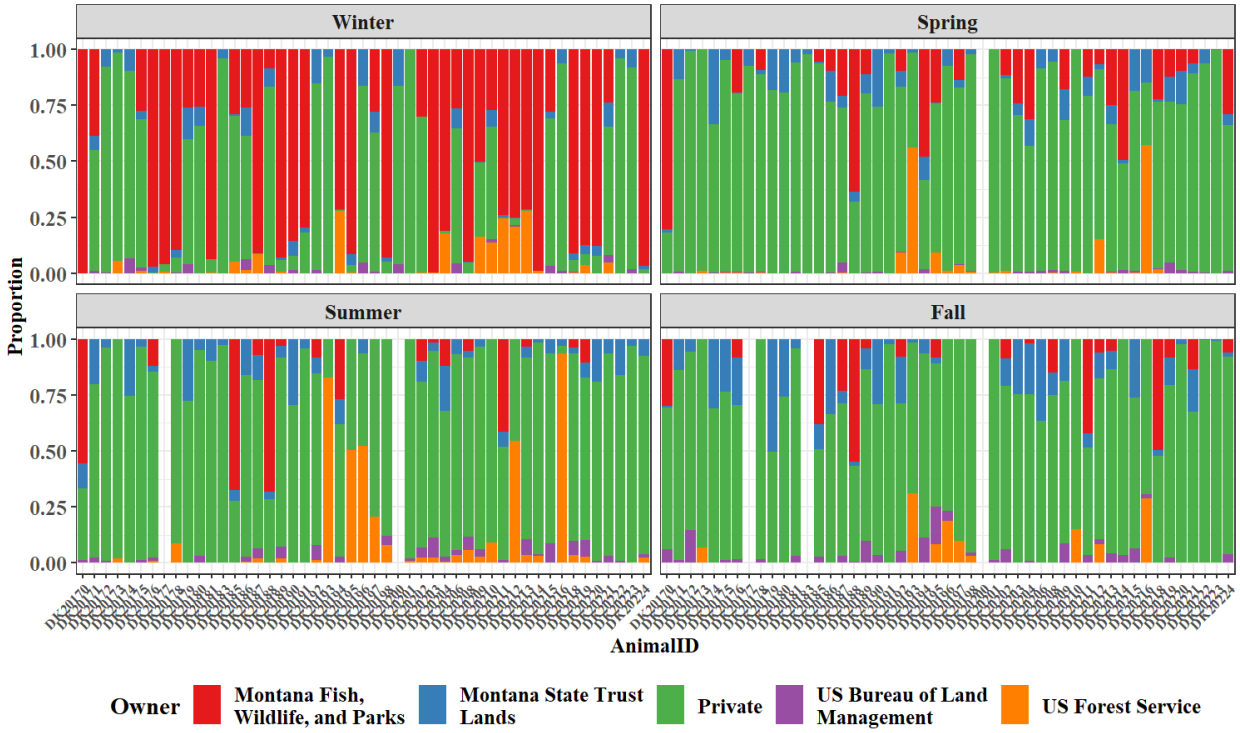

Figure 6. The proportion of individual elk locations occurring on Montana Fish, Wildlife and Parks, Montana State Trust, Private, Bureau of Land Management and Forest Service lands during winter, spring, summer, and fall. Each bar across the x-axis represents an individual collared elk.

Objective 2: ***Capture and collar 40 mule deer in southern Carbon County and initiate mule deer movement data collection.***

We used helicopter netgunning and chemical immobilization to capture 30 female and 10 male mule deer in the Carbon County study area on 28 Feburary 2020 (Figure 7). We collected blood and fecal samples sample to test for pregnancy as well as disease and parasite exposure. A fecal flotation was used to detect parasites or ova shed in fecal samples from a subset of 22 deer. Serum was tested for antibodies to a panel of infectious agents including *Brucella abortus*, Bovine Herpes Virus (BHV-1 aka IBR), Anaplasmosis, Epizootic Hemorrhagic Disease (EHD), Bluetongue Virus (BTV), Parainfluenza-3 (PI3), Leptospirosis (5 serovars), Bovine Respiratory Syncytial Virus (BRSV), and Bovine Viral Diarrhea I and II (BVD I and II). A positive result on these serological tests indicates exposure to an infectious agent but does not confirm infection status.

Figure 7. Net-gunning mule deer in the Carbon County study area, February 28, 2020. Photo by Shawn Stewart.

Of 28 female mule deer tested, 28 (100%) were pregnant. Serology and parasite results were generally similar to other ungulates in Montana. All 40 mule deer tested negative for exposure to *Brucella abortus*. Of 22 fecal samples evaluated, 4 contained *Nematodirus sp.* roundworm eggs, 4 contained strongylate roundworm eggs, 1 contained evidence of *Moniezia sp*. Protozoa. None of the mule deer tested had evidence of exposure to BRSV, BVD I and II, or Leptospirosis. Mule deer showed evidence of exposure to Anaplasmosis (n=25, 63%), BTV (n=1, 2.5%), BHV (n=9, 23%), EHD (n=4, 10%), Leptospirosis (n=3, 6.1%) and Parainfluenza-3 (n=40, 100%).

Each mule deer was outfitted with a Lotek LiteTrack collar programmed to collect locations every 2 hours for 3 years. Location data are uploaded daily through the Iridium satellite service. Collars transmit a mortality notice if the collar is stationary for more than 6 hours. To date, one animal in poor condition died shortly after capture, and 4 have died since of unknown causes. We have collected a total of 96,476 GPS locations as of October 9, 2020 (Figures 8, 9). Mule deer were captured on winter range within 1–4km of the Clark's Fork of the Yellowstone River near Belfry, Montana and south to the Wyoming border. In the subsequent summer of 2020, some deer remained resident in the same area with overlapping winter and summer ranges (Figure 8). However, many others migrated to distinct summer ranges, predominately to the west and northwest, with the longest migration being approximately 42km straight-line distance (deer id CCO-40, male). Generally, there was no clear distinction in migration patterns between males and females (Figure 9).

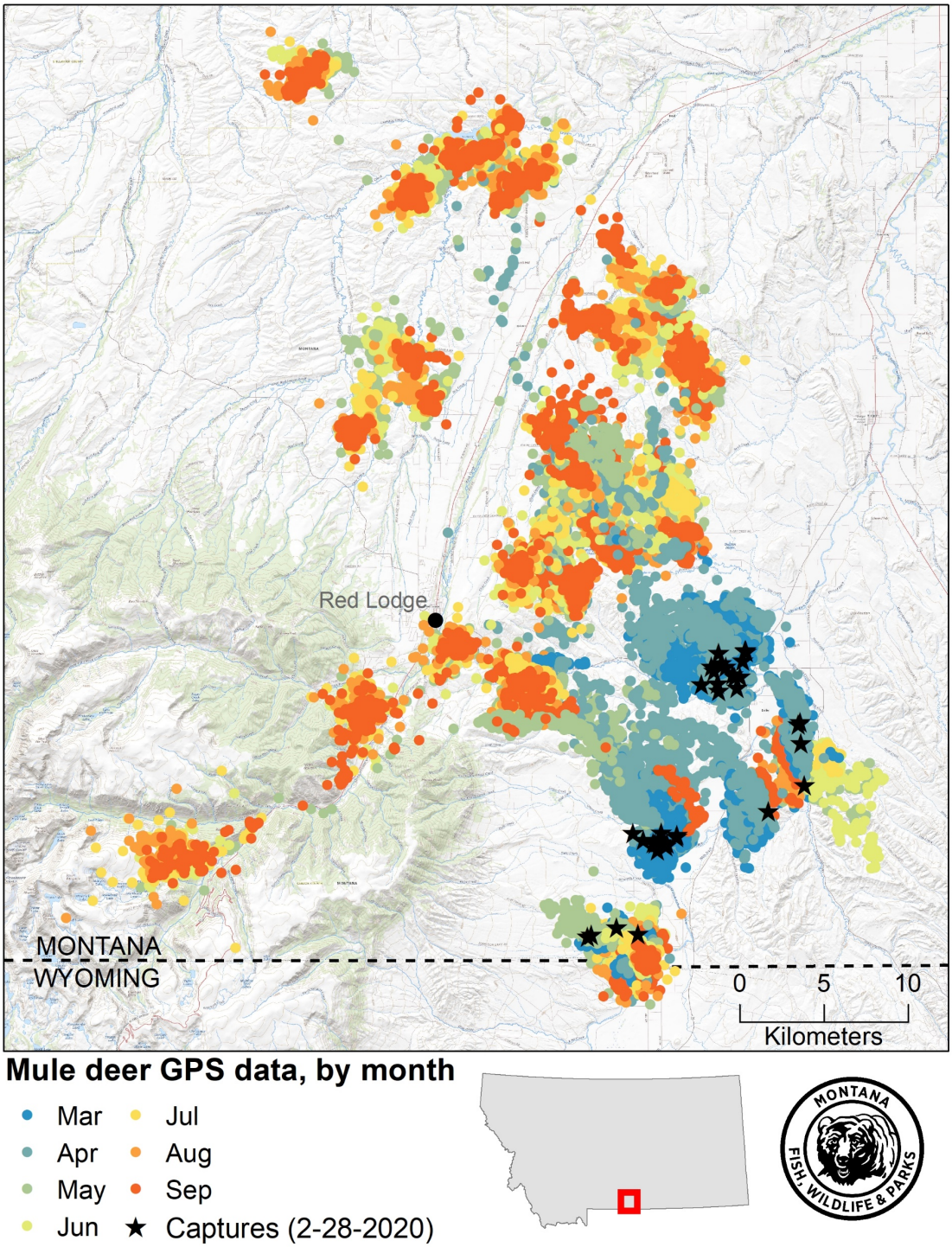

Figure 8. GPS location data spanning March–September, 2020, color-coded by month, collected from collared 30 female and 10 male mule deer in the Carbon County study area, near Red Lodge, MT. Winter capture locations for all deer shown with black stars.

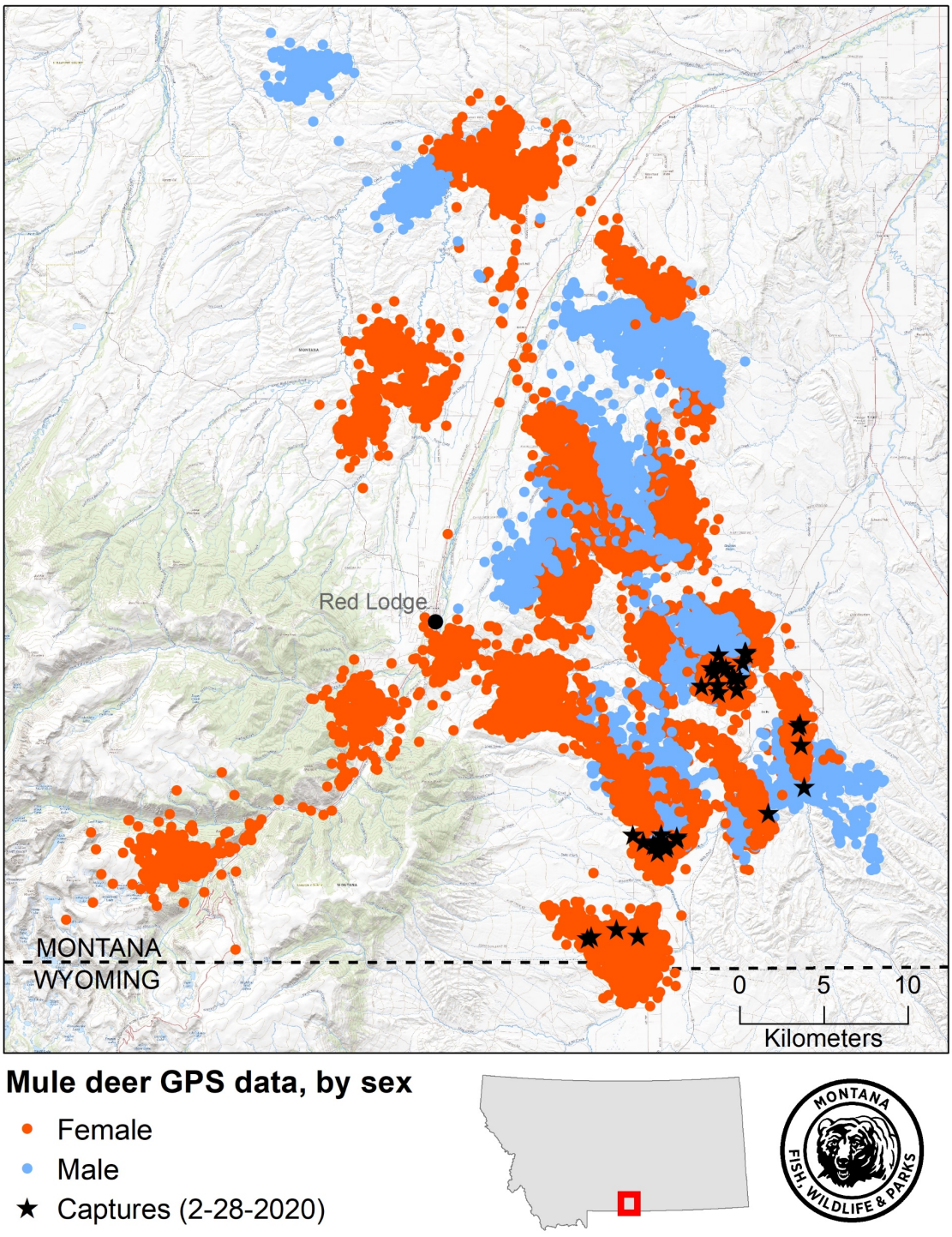

Figure 9. GPS location data spanning March–September, 2020, color-coded by sex, collected from collared 30 female and 10 male mule deer in the Carbon County study area, near Red Lodge, MT. Winter capture locations for all deer shown with black stars.