ECOLOGICAL INVENTORY AND HEALTH ASSESSMENT OF SPOTTED DOG WMA

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Prepared for:

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1420 East Sixth Avenue
Helena, Montana 59620-0701

Contract: FWP No. 140229

March 2015

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ACKNOWLEDGEMENTS

The authors would like to extend a special thank you to the following Montana Department of Fish, Wildlife and Park personnel: Rick Northrup, Wildlife Habitat Bureau Chief; Dave Dziak, Region 2 WMA Manager; Kelvin Johnson, Wildlife Habitat Biologist; Mike Thompson, Regional Wildlife Manager; and Ray Vinkey, Wildlife Biologist. In addition, we would also like to thank Steve Knapp and Mike Frisina, retired Montana Department of Fish, Wildlife and Parks personnel. All of them provided project coordination, planning information, site history, and technical assistance. Their assistance was greatly appreciated.

Funding for this project was provided by Montana Department of Fish, Wildlife and Parks, Wildlife Habitat Bureau, 1420 East Sixth Avenue, P. O. Box 200701, Helena, Montana, 59620-0701, Contract: FWP Number 140229.

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EXECUTIVE SUMMARY

Background

The total acreage of Spotted Dog Wildlife Management Area (WMA) is 37,877 acres. Montana Department of Natural Resources and Conservation (MTDNRC) lands within the WMA are 10,261 acres. Prior to conducting the 2014 work, Montana Department of Fish, Wildlife, and Parks (MTFWP) instructed Ecological Solutions Group, LLC to modify (e.g., reduce) portions of the northern and eastern boundaries to represent the boundaries outlined in this report. This resulted in a reduction of 2,576 acres from the original size of 37,877 acres to 35,301 acres. In addition, the private inholdings were not assessed for a further reduction of 1,315 acres to a total assessed acreage of 33,986 acres.

Montana Department of Fish, Wildlife, and Parks (MTFWP) acquired the Spotted Dog WMA from the Rock Creek Cattle Company in September 2010. The combined purchased lands and lands leased from MTDNRC total approximately 33,986 acres. The initial primary management goals (Montana Fish, Wildlife, and Parks 2010a) for the WMA were to:

- Permanently protect fish and wildlife resources;
- Enhance critical winter habitat for elk/wapiti (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), and pronghorn (*Antilocapra americana*);
- Maintain migratory patterns for elk/wapiti (*Cervus canadensis*) to and from adjacent USDA National Forest lands;
- Provide public access to previously inaccessible lands;
- Maintain landscape connectivity between the Little Blackfoot and Clark Fork watersheds; and
- Replace lost/injured natural resources that were the subject of Montana v. ARCO.

Uplands within Spotted Dog WMA comprise a complex mosaic of grasslands, shrublands, and forested areas. Large portions of the upland area in Spotted Dog WMA are important habitat for several large game species, including elk/wapiti (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), moose (*Alces americanus*), and pronghorn (*Antilocapra americana*). Extensive areas of winter range for these species contain large stands of the important browse species, *Purshia tridentata* (antelope bitterbrush), on west facing slopes and ridge lines that remain relatively free of deep snow accumulation. Other sites support extensive, nearly pristine, stands of the highly desirable forage species, *Festuca campestris* (rough fescue); and higher elevation sites contain forested areas. Forested areas are dominated by *Pseudotsuga menziesii* var. *glauca* (Douglas fir), and most of the larger stands have been harvested for timber over the past few decades. Timber harvest on these areas has opened the tree canopy and altered the vegetation composition, severely impacting habitat values in the near term until regeneration replaces the degraded tree canopy.

Livestock have grazed the Spotted Dog WMA area since the late 1800s. Cattle were observed in much of the WMA at the time of the inventory and ecological health assessment work in 2011, but defined stocking rates and grazing management plans were unknown to us. According to the 2010 Draft Environmental Assessment (EA) (Montana Fish, Wildlife, and Parks 2010a), approximately 2,000 cow/calf pairs used the WMA, primarily from the Rock Creek Cattle Company. Livestock grazing had been halted on the Spotted Dog WMA in 2013 and no

active livestock grazing was allowed in 2014, though a number of trespass cow/calf pairs were occasionally observed on the property during the 2014 inventory and ecological health assessment work.

Scope of Work

In July 2011 and July 2014, Ecological Solutions Group LLC (ESG) conducted upland, lotic, and lentic inventories on 192 polygons in Spotted Dog WMA, northeast of Deerlodge, Montana. The purpose of the inventory and ecological health assessment work was to assess current conditions of rangeland and wetland ecological function, to document baseline rangeland and wetland conditions for future monitoring, and to assist land managers in making data-based management decisions. As requested by MTFWP personnel, the polygons to be inventoried were distributed across much of the Spotted Dog WMA. A total of 128 upland inventoried polygons encompassed 2,385.73 acres which represent 33,265.27 total acres of uplands. There were 55 lotic polygons inventoried in the WMA and these polygons encompassed 469.99 acres which represent 706.85 total acres of lotic sites. Finally, nine inventoried lentic polygons encompassed all of the 13.53 lentic acres in the WMA.

Location of the Study Area

Spotted Dog WMA is located in western Montana, approx. five miles northeast of the city of Deer Lodge, Montana. The following figures show:

- The general location of Spotted Dog WMA in the State of Montana (Executive Summary Figures 1 and 2);
- A topographic map showing the “checkerboard” pattern of land ownership inside the outer boundary of the WMA (Executive Summary Figure 3); and
- Locations of the 192 inventoried polygons on Spotted Dog WMA (Executive Summary Figure 4).

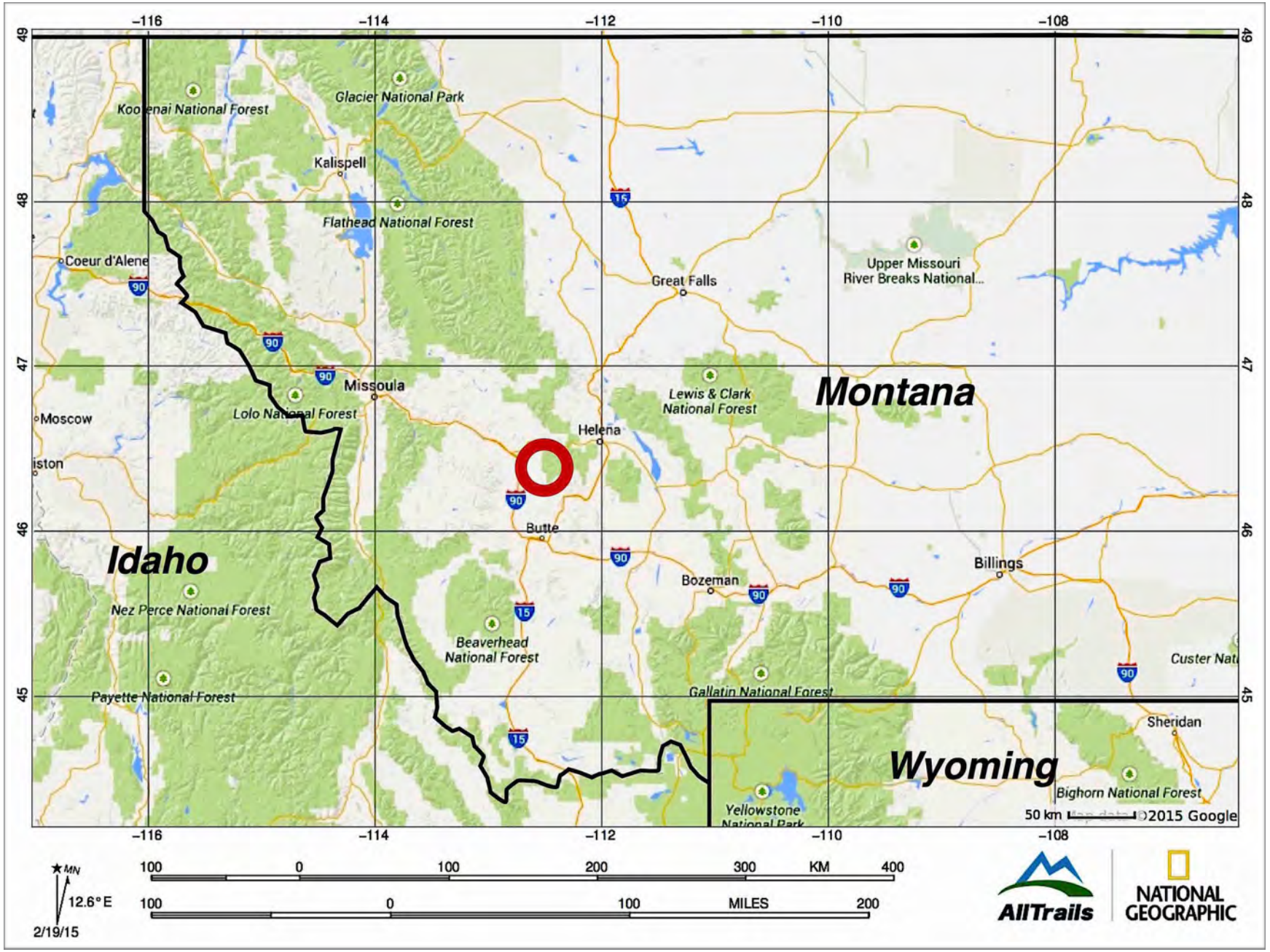
Overall Inventory and Ecological Health Summary for Spotted Dog WMA

The breakout of land ownership within the outer boundary of Spotted Dog WMA is:

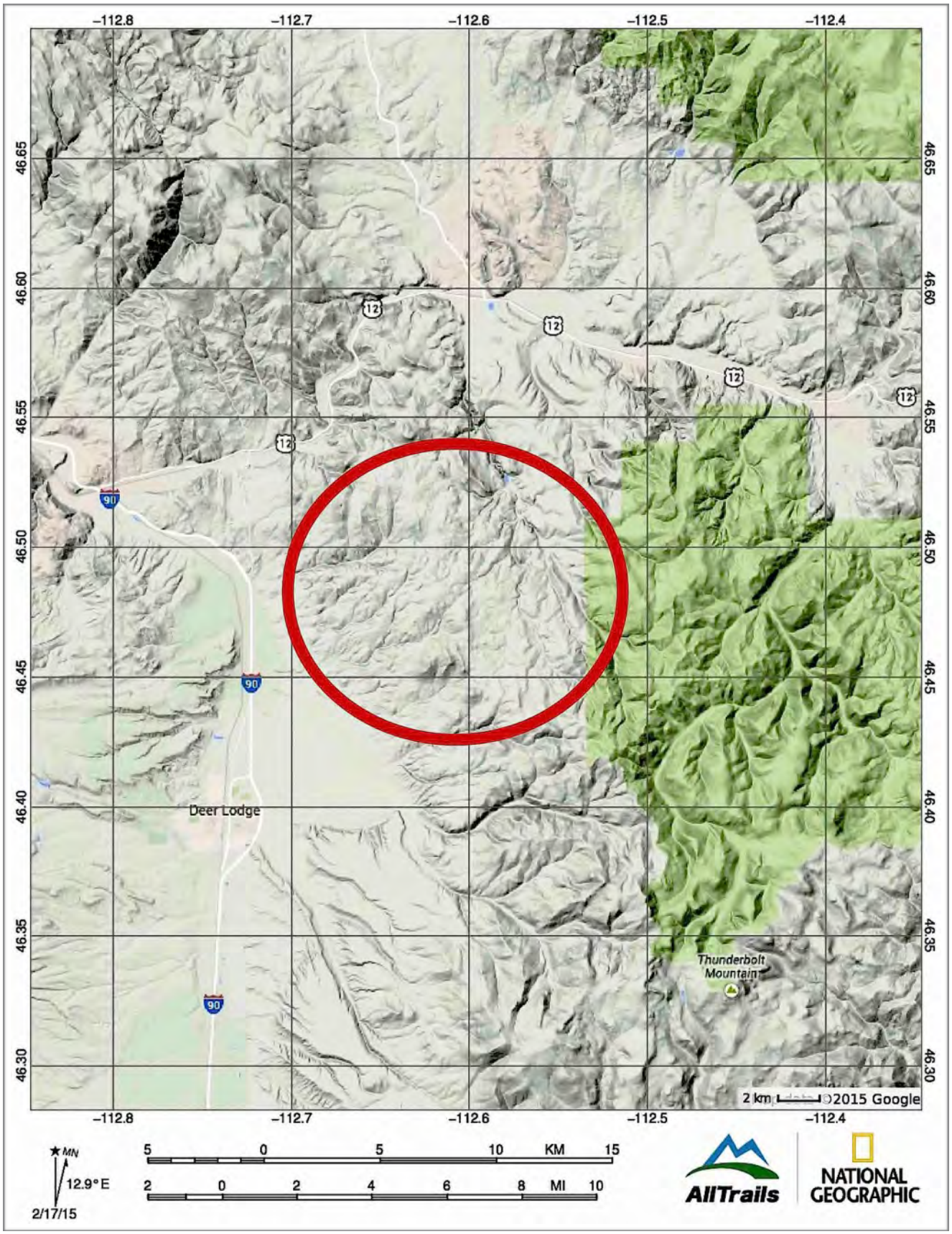
- Total Acres within the WMA (includes private lands and MTDNRC administered lands): 35,301.03 acres
- Private inholdings = 1,315.38 acres (3.7 percent)
- MTFWP lands = 24,053.00 acres (68.1 percent)
- MTDNRC lands = 9,932.65 acres (28.1 percent)
- TOTAL ACRES OF MTFWP AND MTDNRC = 33,985.65 acres (96.3 percent)

The total acres in Spotted Dog WMA by lotic, lentic, and upland types (including vegetation types [i.e., forest/ woodlands, shrublands, grasslands, and modified sites]) (excluding the private inholdings):

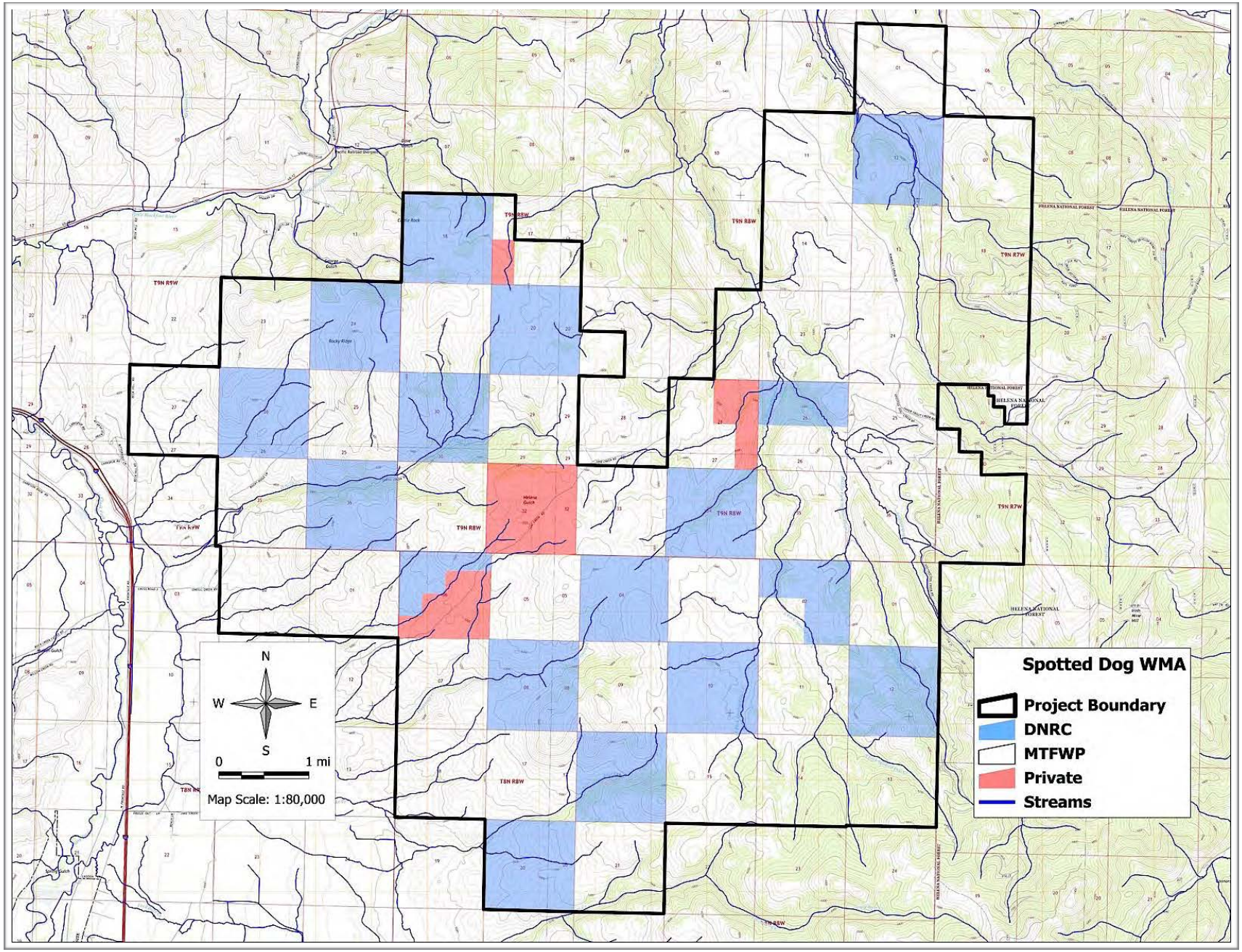
- Lotic sites = 706.85 acres (2.1 percent) (lotic sites on MTFWP lands = 469.99 acres; lotic sites on MTDNRC lands = 236.86 acres)
- Lentic sites = 13.53 acres (0.0 percent)
- Upland sites = 33,265.27 (97.9 percent)
  - ❖ Forest/Woodland site = 7,566.72 acres (22.7 percent)
  - ❖ Shrubland sites = 4,371.78 acres (13.1 percent)
  - ❖ Grassland sites = 21,223.77 acres (63.8 percent)
  - ❖ Modified site = 103.00 acres (0.3 percent)
- TOTAL ACRES = 33,985.65



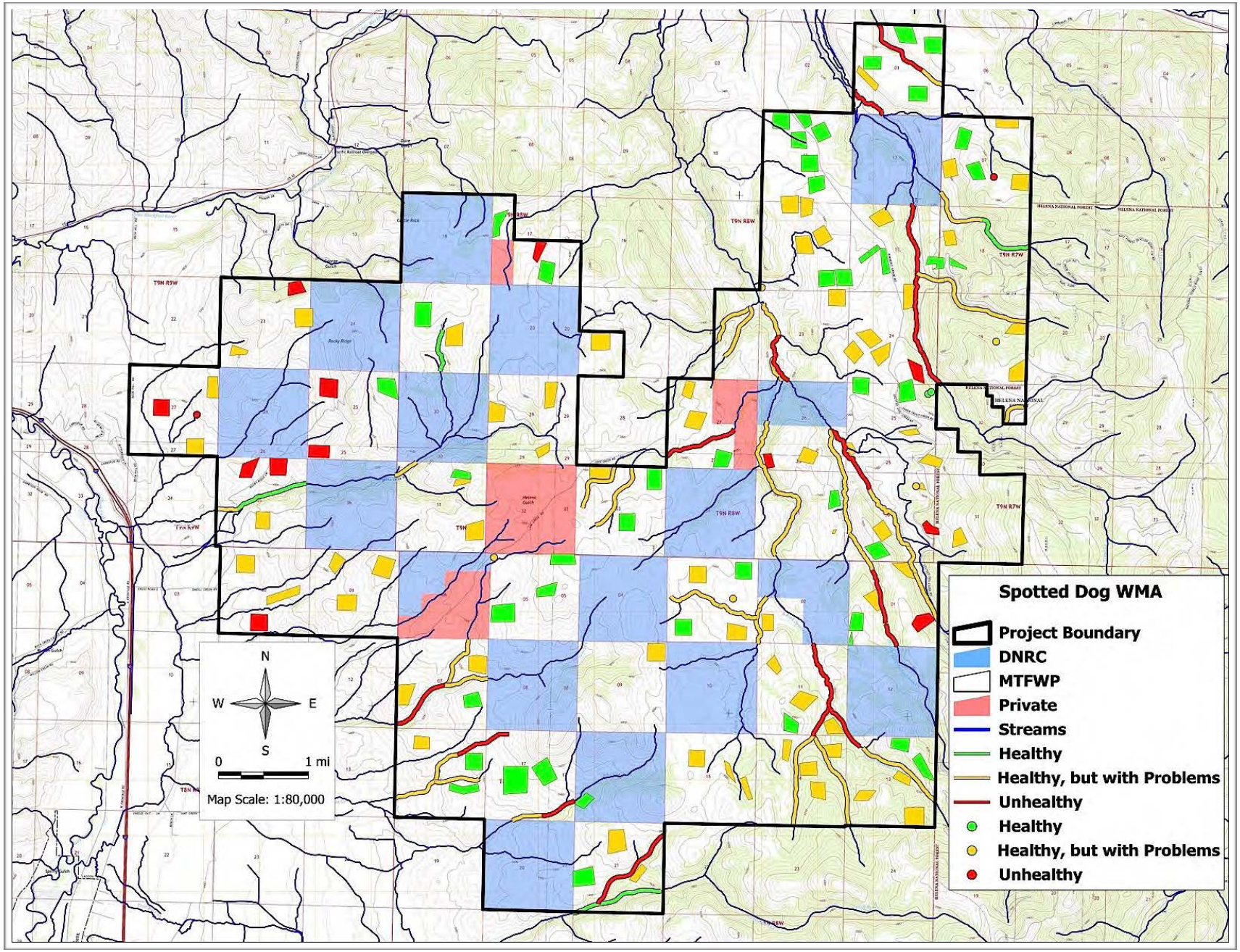
Executive Summary Figure 1. Map of western Montana, showing the general location of Spotted Dog WMA (red circle)



Executive Summary Figure 2. Overview map of west central Montana, showing the general location of Spotted Dog WMA (red circle)



Executive Summary Figure 3. Topographic map of Spotted Dog WMA showing land ownership



Executive Summary Figure 4. Topographic map of all 192 sites sampled in Spotted Dog WMA

Lotic and lentic wetland sites in Spotted Dog WMA occupy only a very small portion of the entire property, but these sites are far more important than their proportional area would suggest. Upland sites are in much better overall health than the lotic and lentic sites (Executive Summary Table 1). Another estimated 236.86 acres of lotic wetland are on MTDNRC lands that lie within the outer perimeter boundary of Spotted Dog WMA, but these MTDNRC sites were generally not accessed for inventory or ecological health assessment. Upland sites have what appear to be fewer polygons per acre than do the lotic and lentic sites. This is because the lotic and lentic sites are inventoried as a 100 percent sample, whereas the uplands are inventoried as a representative sample.

Executive Summary Table 1. Distribution and range of ecological health scores among the various site in Spotted Dog WMA

Type	Number of Polygons	Acres	Weighted[1] Average Vegetation Score[2]	Weighted[1] Average Physical Site Score[2]	Overall Weighted[1] Average Health Score[2]	Range of Health Score[2]
Lotic Sites on MTDNRC Lands		236.86	—	—	—	—
Lotic Sites	55	469.99	63%	60%	62%	83% - 35%
Lentic Sites	9	13.53	63%	65%	64%	95% - 38%
Upland Sites	128	33,265.27	70%	82%	75%	100% - 38%
WMA TOTAL	***192***	***33,985.65***	***70%***	***82%***	***75%***	***100% - 35%***

[1]Weighted average score = scores are weighted based upon the size (acres) of each polygon

[2]Health score categories:

100% to 80% = Healthy/Proper Functioning Condition

79% to 60% = Healthy, but with Problems/Functioning at Risk

<60% = Unhealthy/Nonfunctional

Approximately two thirds of Spotted Dog WMA is occupied by grass dominated uplands (grasslands) (Executive Summary Table 2), which received the highest health scores among all the types of upland site. Forest/woodland sites received the lowest scores, reflecting the great degree of recent disturbance from timber harvest activities. (Coniferous forest and aspen woodland are both included in the forest/woodland type, but parenthetically separated in Executive Summary Table 2.)

Executive Summary Table 2. Distribution and range of health scores in Spotted Dog WMA upland inventory and ecological health assessment polygons among the various upland vegetation types

Type	Number of Polygons	Acres	Weighted[1] Average Vegetation Score[2]	Weighted[1] Average Soil/Landscape Score[2]	Overall Weighted[1] Average Health Score[2]	Range of Health Score[2]
Forest/Woodland	32	7,566.72	58%	82%	68%	97% - 38%
Coniferous Forest[3]	(29)	(7,467.36)	(58%)	(82%)	(68%)	(97% - 38%)
Aspen Woodland[3]	(3)	(99.36)	(60%)	(97%)	(76%)	(83% - 68%)
Shrubland	12	4,371.78	61%	83%	70%	84% - 49%
Grassland	83	21,223.77	76%	82%	79%	100% - 44%
Modified	1	103.00	68%	77%	73%	73% - 73%
UPLAND TOTAL	***128***	***33,265.27***	***70%***	***82%***	***75%***	***100% - 38%***

[1]Weighted average score = scores are weighted based upon the size (acres) of each polygon

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[3]Coniferous forest and aspen woodland types are part of the forest/woodland type

A large part of the lotic wetland sites (39 percent of the total acres) are in the Unhealthy category, and most of the remainder are Healthy, but with Problems (Executive Summary Table 3). Of the few small lentic sites, over half (56 percent) are rated Unhealthy. The condition of these lotic and lentic wetland sites reflects the long history of livestock use and the habit of the livestock to disproportionately impact these wetland systems. Over one third of upland sites rated Healthy, and the bulk of the rest rated Healthy, but with Problems.

Executive Summary Table 3. Distribution of Spotted Dog WMA area by site type and among the three health categories

Type	Number of Polygons	Acres	Healthy/Proper Functioning Condition[1] Acres (%)	Healthy, but with Problems/Functional At Risk[1] Acres (%)	Unhealthy/ Nonfunctional[1] Acres (%)
Lotic Sites	55	469.99	19.76 (4%)	267.49 (57%)	182.74 (39%)
Lentic Sites	9	13.53	0.57 (4%)	5.27 (40%)	7.39 (56%)
Upland Sites	128	33,265.27	11,699.39 (35%)	18,011.08 (54%)	3,554.81 (11%)
WMA	***192***	***33,748.49***	***11,719.72 (35%)***	***18,283.84 (54%)***	***3,744.94 (11%)***

[1]Health score categories

100% to 80% = Healthy/Proper Functioning Condition

79% to 60% = Healthy, but with Problems/Functioning at Risk

<60% = Unhealthy/Nonfunctional

Forest/Woodland sites in Spotted Dog WMA rated mostly Healthy, but with Problems (Executive Summary Table 4). Only three percent rated Healthy, and 19 percent rated Unhealthy. This range of condition reflects the degree of disturbance from timber harvest over the past two decades, or so. The shrublands show a broad spectrum of health rating, reflecting the wide variation of usage experienced by these sites, as one goes from north to south across the WMA. Grasslands occupy approximately two thirds of all upland area on the WMA. Almost half these grasslands are rated Healthy, with exactly another half rated Healthy, but with Problems, leaving only five percent rated Unhealthy.

Executive Summary Table 4. Distribution of Spotted Dog WMA upland area among the three health categories and the various upland vegetation types

Type	Number of Polygons	Acres	Healthy/Proper Functioning Condition[1] Acres (%)	Healthy, but with Problems/Functional At Risk[1] Acres (%)	Unhealthy/ Nonfunctional[1] Acres (%)
Forest/ Woodland	32	7,566.72	252.58 (3%)	5,859.87 (78%)	1,454.25 (19%)
Shrubland	12	4,371.78	1,818.93 (42%)	1,500.02 (34%)	1,052.83 (24%)
Grassland	83	21,223.77	9,627.88 (45%)	10,548.19 (50%)	1,047.73 (5%)
Modified	1	103.00	0.00 (0%)	103.00 (100%)	0.00 (0%)
UPLAND	***128***	***33,265.27***	***11,699.39 (35%)***	***18,011.08 (54%)***	***3,554.81 (11%)***

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INTRODUCTION

Background

The total acreage of Spotted Dog Wildlife Management Area (WMA) is 37,877 acres. Montana Department of Natural Resources and Conservation (MTDNRC) lands within the WMA are 10,261 acres. Prior to conducting the 2014 work, Montana Department of Fish, Wildlife, and Parks (MTFWP) instructed Ecological Solutions Group, LLC to modify (e.g., reduce) portions of the northern and eastern boundaries to represent the boundaries outlined in this report. This resulted in a reduction of 2,576 acres from the original size of 37,877 acres to 35,301 acres. In addition, the private inholdings were not assessed for a further reduction of 1,315 acres to a total assessed acreage of 33,986 acres.

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Scope of Work

In July 2011 and July 2014, Ecological Solutions Group LLC (ESG) conducted upland, lotic, and lentic inventories on 192 polygons in Spotted Dog WMA, northeast of Deerlodge, Montana. The purpose of the inventory and ecological health assessment work was to assess current conditions of rangeland and wetland ecological function, to document baseline rangeland and wetland conditions for future monitoring, and to assist land managers in making data-based management decisions. As requested by MTFWP personnel, the polygons to be inventoried were distributed across much of the Spotted Dog WMA. A total of 128 upland inventoried

polygons encompassed 2,385.73 acres which represent 33,265.27 total acres of uplands. There were 55 lotic polygons inventoried in the WMA and these polygons encompassed 469.99 acres which represent 706.85 total acres of lotic sites. Finally, nine inventoried lentic polygons encompassed all of the 13.53 lentic acres in the WMA.

LOCATION OF THE STUDY AREA

Spotted Dog WMA is located in western Montana, approx. five miles northeast of the city of Deer Lodge, Montana. The following figures show:

- The general location of Spotted Dog WMA in the State of Montana (Figures 1 and 2);
- A topographic map showing the “checkerboard” pattern of land ownership inside the outer boundary of the WMA (Figure 3); and
- A GoogleEarth satellite image showing the pattern of land ownership inside the outer boundary of the WMA (Figure 4).

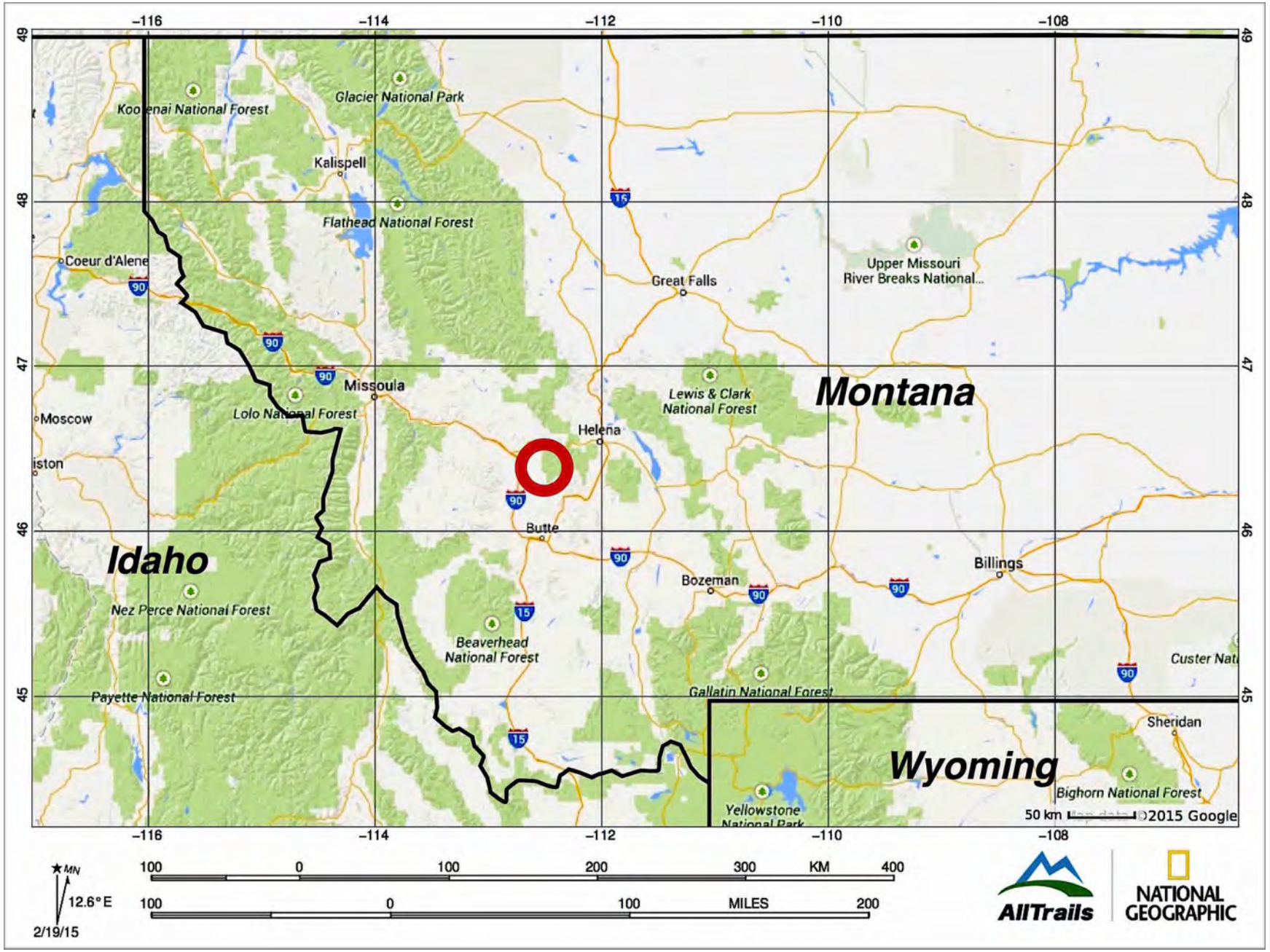

Figure 1. Map of western Montana, showing the general location of Spotted Dog WMA (red circle)

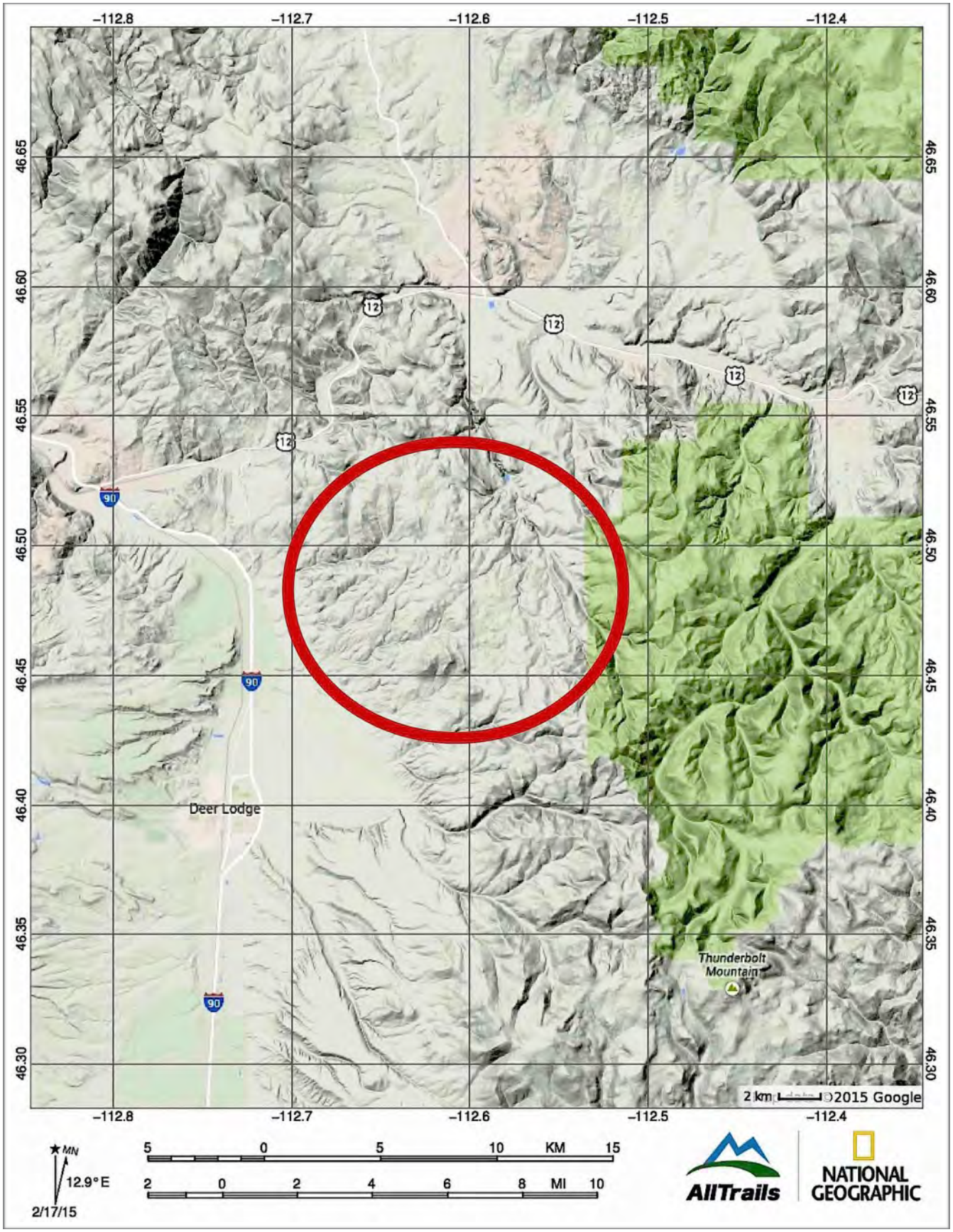

Figure 2. Overview map of west central Montana, showing the general location of Spotted Dog WMA (red circle)

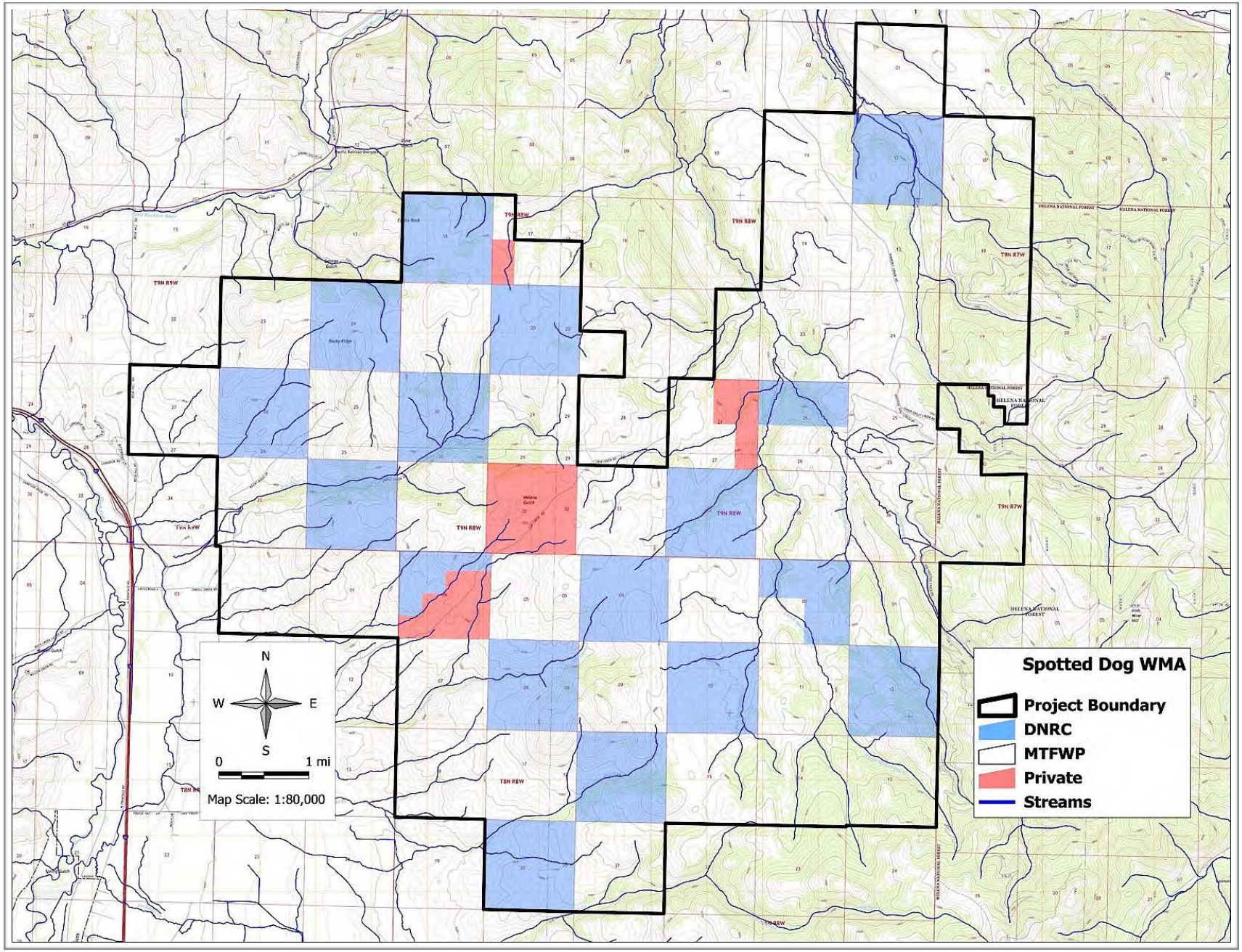

Figure 3. Topographic map of Spotted Dog WMA showing land ownership

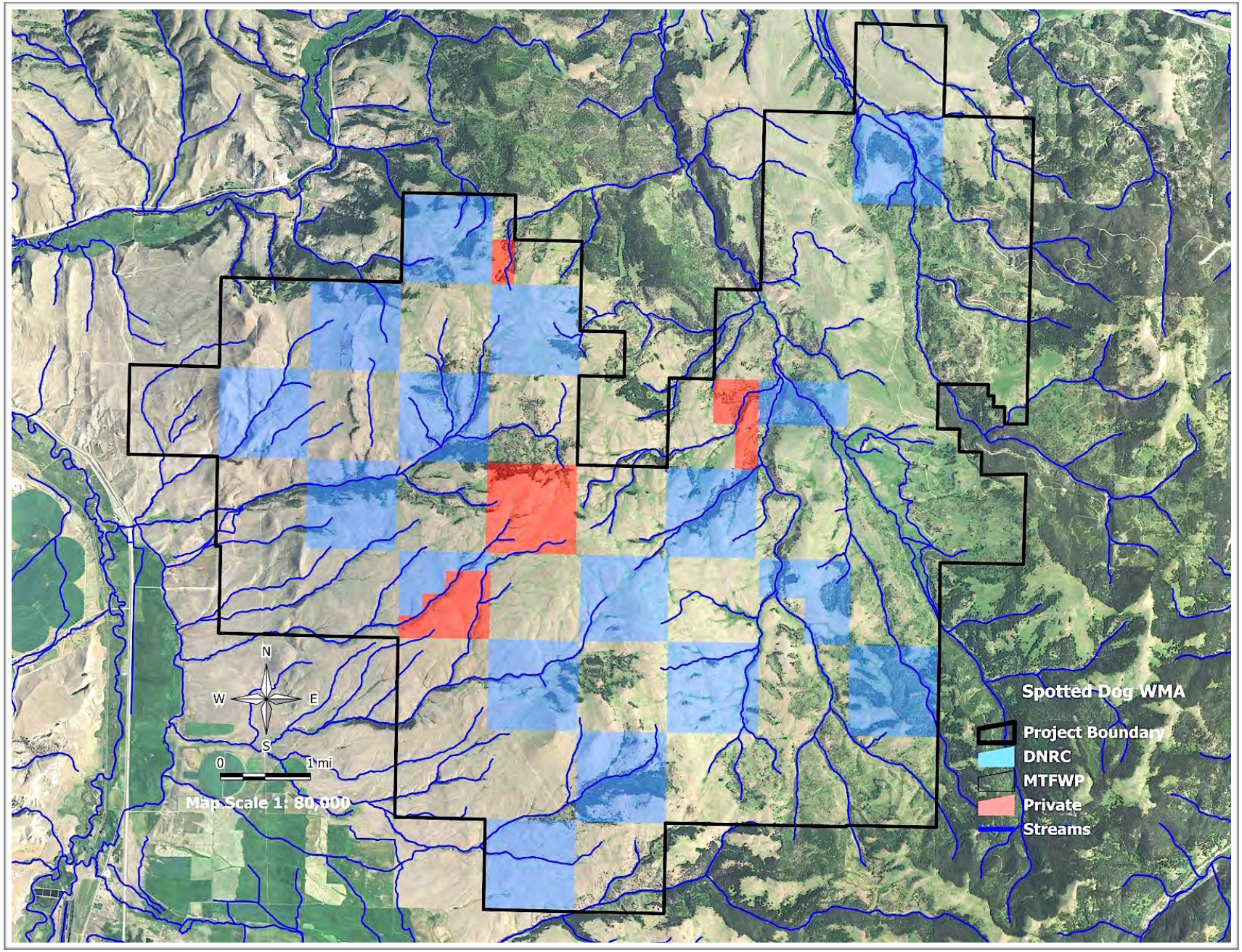

Figure 4. Aerial imagery of Spotted Dog WMA showing land ownership, forest lands, grasslands, and streams

PHYSIOGRAPHY AND GEOLOGY OF THE STUDY AREA

Spotted Dog WMA is a large, physiologically and geologically complex area between the Garnet and Boulder Mountains. The study area sits on large rolling hills, moderately steep, to steep, slopes and upland benches, with many streams, small drainages, swales, steep rocky slopes, and rock outcrops interspersed. The drainages in the western portion of the WMA generally slope west to the Clark Fork River, while the drainages in the eastern portion of the WMA drain into the Little Blackfoot River. The elevations of inventoried polygons range from about 3,471 ft to about 6,429 ft.

A small portion of the northwestern corner of the study area lies within the Carter Creek Coberly Formation, which is a cretaceous, sedimentary rock map unit. A different cretaceous sedimentary member of the Blackleaf Formation is found on the eastern edge of the study area (Montana Bureau of Mines and Geology 2007). However, the majority of the area is within igneous and metamorphic map units, particularly the Elkhorn Mountains Volcanic unit, and the Andesite/basalt unit. Parent materials range from colluvium, calcareous alluvium, to residuum weathered from igneous rock (USDA Natural Resources and Conservation Service 2015). Moderate to steep slopes and benches, which tend to be higher in relative elevation, have a combination of the Braziel-Tolbert complex, 15 to 35 percent slopes, Braziel stony loam, 15 to 35 percent slopes, and the Yreka gravelly loam, 15 to 35 percent slopes soil classifications. Lower elevation benches and slopes tend to have a combination of the Braziel-Tolbert complex, 8 to 15 percent slopes, Roy-Tolbert complex, 15 to 35 percent slopes, and the Danvers clay loam, 8 to 15 percent slopes slopes soil classifications. There are over 35 soil classification units found on the study area, however the major soil classification units mentioned above in combination make up approximately 70 to 80 percent of the area. These soil classifications are generally well drained, have deep water tables, and rarely or never flood (USDA Natural Resources and Conservation Service 2015).

CLIMATE DATA

Climate data is available for Montana towns near the Spotted Dog WMA, including Deer Lodge and Helena (Table 1).

Table 1. Sites with weather records near Spotted Dog WMA

Location	Approx. Distance to Spotted Dog WMA	Elevation
Deer Lodge, Montana	5 air miles	4,535 ft
Helena, Montana	23 air miles	3,994 ft

As shown in Tables 2 and 3, the areas near the Spotted Dog WMA tend to be cold in winter and warmest mid-summer. Average temperatures range from well below freezing during mid-winter, to moderately hot during mid-summer. The wettest months for the area are May and June.

Table 2. Weather records for sites near Spotted Dog WMA

Location	Average Monthly Temp[1]	Average Monthly Low Temp (Month)[1]	Average Monthly High Temp (Month)[1]	Historic Low Temp (Year)[2]	Historic High Temp (Year)[2]	Annual Precipitation[1]
Deer Lodge, MT	41.9° F	26.4° F (Dec-Jan)	57.4° F (Jul)	Unknown	Unknown	10.6 inches
Helena, MT	44.0° F	31.2° F (Dec-Jan)	56.7° F (Jul)	-42° F (1957)	105° F (2002)	11.32 inches

Source: [1]IDcide 2015, [2]The Weather Channel 2015

Table 3. Monthly temperature and precipitation averages for sites near Spotted Dog WMA in 2011 and 2014 in Helena, Montana

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Temperature (˚F)												
2011	25.3	17.1	31.1	35.4	43.7	52.2	62.8	63.5	55.8	44.2	29.1	23.7
2014	27.7	12.7	29.1	38.7	47.5	52.3	`64.0	61.3	53.2	46.6	24.6	22.8
Average Precipitation (inches)												
2011	0.39	0.80	0.54	2.89	5.46	3.32	0.96	0.65	0.19	1.02	0.58	0.72
2014	1.23	2.48	2.50	0.27	1.96	4.43	0.38	3.71	0.52	0.33	0.77	0.01

Source: National Climatic Data Center 2015

Monthly mean temperatures and precipitation totals are displayed in Table 3. As the data suggests, both of these sampling years were wetter and cooler than the historic climate averages. The total precipitation for 2011 was 17.52 inches and 18.59 inches for 2014. This is significantly higher than the overall climatic average for the same area (11.32 inches). The average temperature in 2011 was 40.3 degrees F and 40.0 degrees F in 2014, also cooler than the climatic average of 44.0 degrees F. In general, 2011 had a cooler, wetter spring (April thru May) and a warmer, drier summer (June thru September) than 2014.