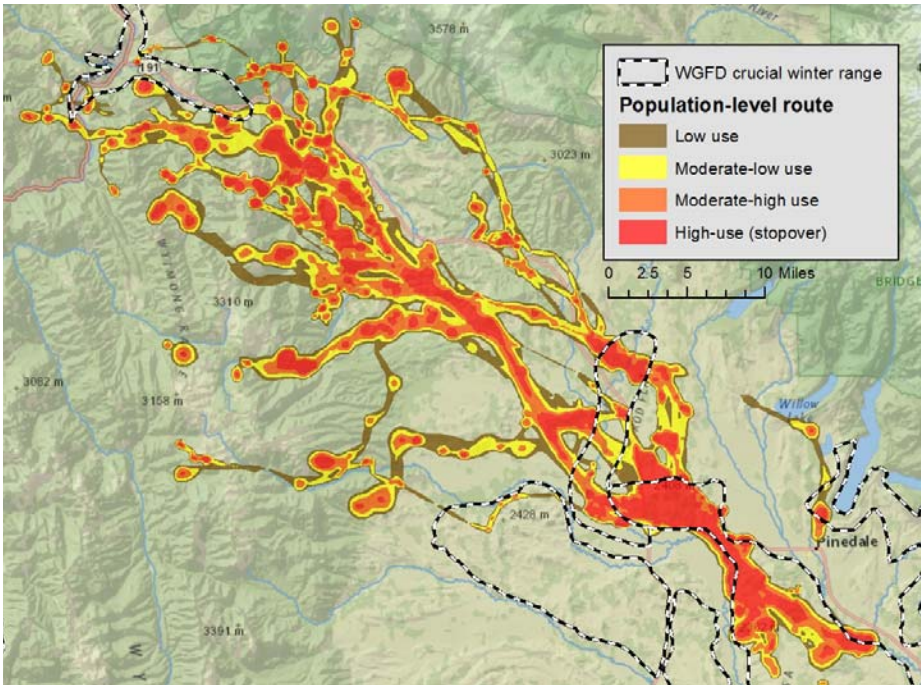
Mule Deer and Pronghorn Monitoring in the Pinedale Anticline Project Area

2012 Mule Deer and Pronghorn Migration Update



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NATURAL RESOURCES ◆ SCIENTIFIC SOLUTIONS

OVERVIEW

As part of the PAPO wildlife monitoring, we maintain a sample (~30 animals) of GPS-collared deer and pronghorn to monitor winter distribution as it relates to gas development and annual winter counts. The GPS data provide additional opportunity to delineate migration routes for these populations. Here, we provide updated mule deer migration routes for the Mesa and Ryegrass-Soapholes populations, and pronghorn migration routes for the Mesa and Cottonwood Creek populations.

METHODS

Each year, we use the Brownian bridge movement model (BBMM; Horne et al. 2007) to estimate migration routes from GPS data. The BBMM estimates the probability of use, or a utilization distribution (UD), along a migration route. The UDs from individual animals can then be combined to estimate a population-level migration route (Sawyer et al. 2009). This approach allows route segments used as stopover sites (i.e., foraging and resting habitat) to be discerned from those used primarily for movement. Stopovers are important to migratory ungulates because they allow animals to maximize energy intake by migrating in concert with plant phenology (Sawyer and Kauffman 2011). Another benefit of this approach is that when multiple migration routes radiate from a common winter range, we can identify which segments are used by the largest proportion of the population.

Across years, GPS locations were collected at 2- or 3-hr intervals and GPS success was 99%. We followed the methods outlined by Sawyer et al. (2009) where: 1) the BBMM was used to estimate migration routes of individual animals, 2) individual routes were then combined to estimate a population-level migration route, 3) segments within the population-level route were delineated as stopover sites or movement corridors, and 4) route segments were delineated as high, medium, or low-use based on the proportion of the sampled animals that used them. Assuming a representative sample of animals, the estimated migration routes should reflect migratory patterns of the larger wintering populations.

RESULTS

Mule Deer –

We calculated population-level migration routes for mule deer from the Mesa and Ryegrass-Soapholes winter ranges (Figs. 1 & 2). The Mesa migration route included 52 migrations, collected from 38 mule deer between 2003 and 2012. The Ryegrass-Soapholes migration route included 49 migrations, collected from 28 mule deer between 2005 and 2011. The population-level migration routes were characterized by a series of stopover sites where deer spent most of their time, connected by movement corridors through which deer moved quickly (Figs. 1 & 2). As mule deer moved further from winter ranges (north and west), common migration routes splintered into multiple routes that led to different summer ranges.

Route segments within the population-level route did not receive equal levels of use; rather, some were used by a larger proportion of the population than others (Figs. 3 & 4). For the Mesa migration, the route used by the most deer went through Trapper's Point, west across Cora Butte and US 191, crossed the Green River, then north across Webb Draw and Beaver Rim to the south Hoback Rim, and ended in Noble Basin before splintering into multiple routes. For the Ryegrass migration, there were two high-use routes (Fig. 4). Both started near Grindstone Draw and moved west into the Ryegrass. At Aspen Ridge, the two high-use routes split, with one continuing westerly to Merna Butte and the other continuing north to Noble Basin.

Interestingly, the north route to Noble Basin follows the same high-use route used by the Mesa deer. Shapefiles of routes were provided to Wyoming Game and Fish Department.

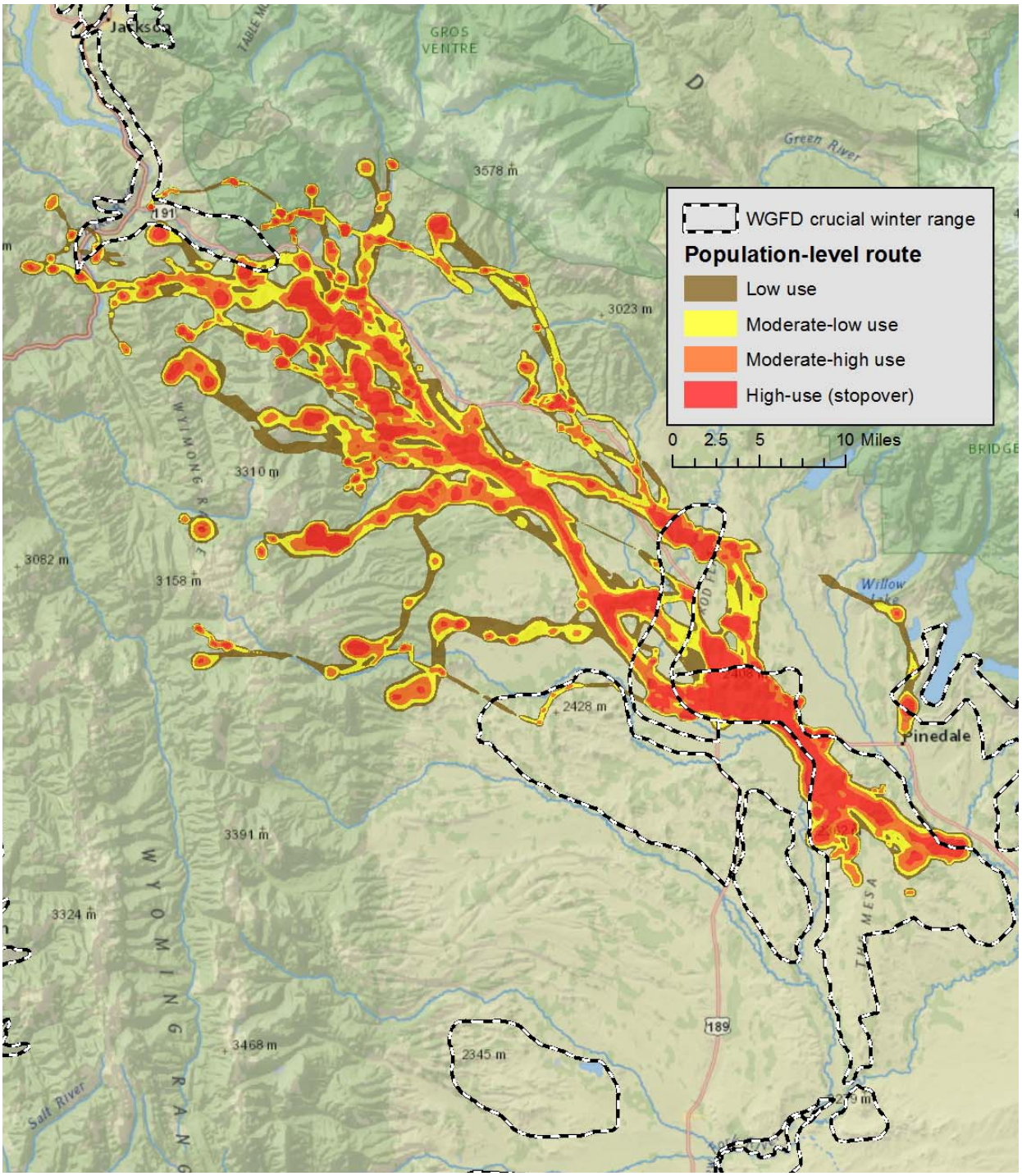

Figure 1. Population-level migration route for mule deer (*n*=38) from the Mesa winter range. Red areas represent migratory segments where deer spent most of their time are termed stopover sites. Orange and yellow segments represent migratory corridors where deer spent less time and moved relatively quickly.

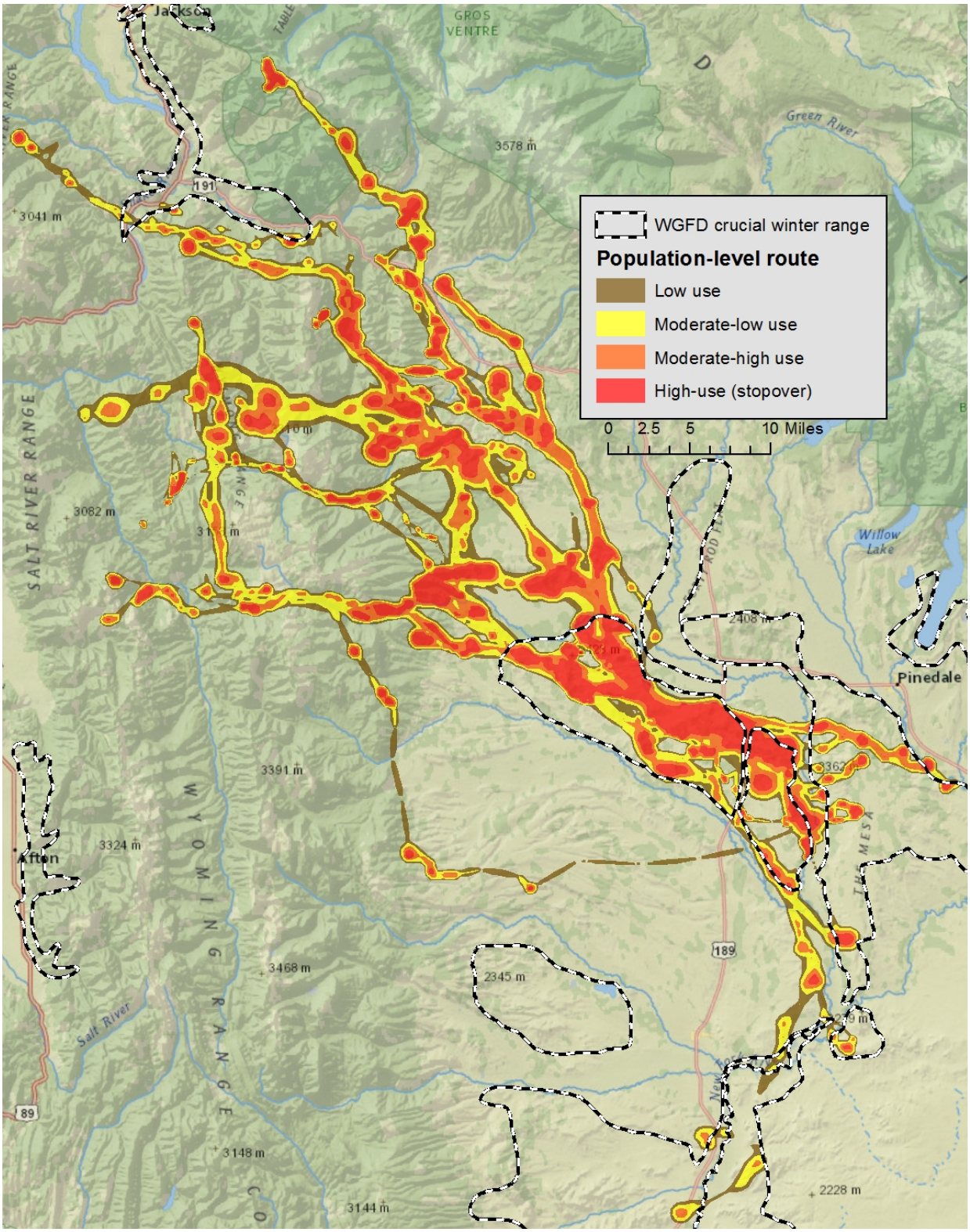

Figure 2. Population-level migration route for mule deer (*n*=28) from the Ryegrass-Soapholes winter range. Red areas represent migratory segments where deer spent most of their time are termed stopover sites. Orange and yellow segments represent migratory corridors where deer spent less time and moved relatively quickly.

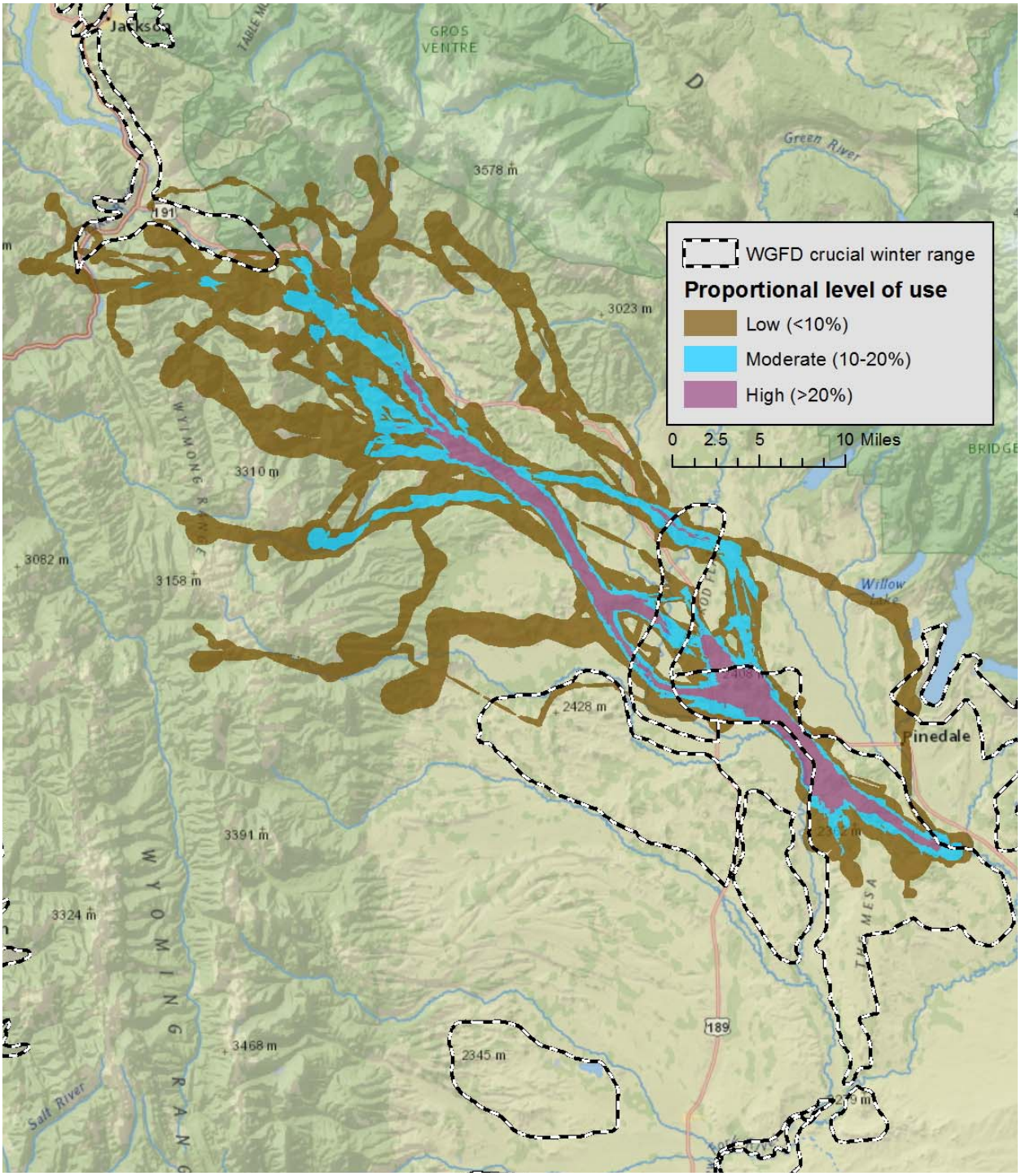

Figure 3. Population-level migration route for mule deer (*n*=38) that migrate northwest from the Mesa winter range. Purple and blue areas represent migratory segments that were used by at least 10% of the sampled population.

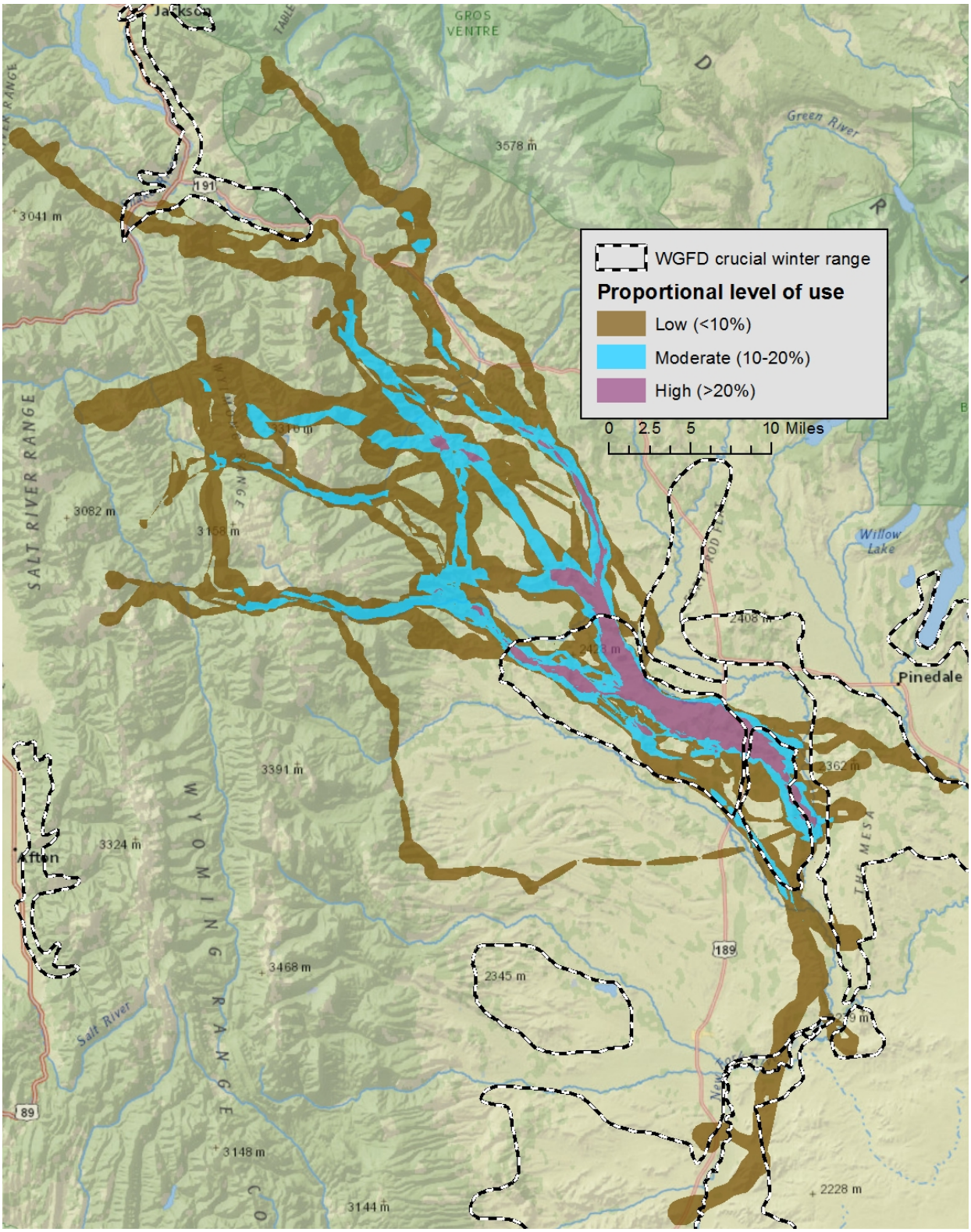

Figure 4. Population-level migration route for mule deer (*n*=28) that migrate northwest from the Ryegrass-Soapholes winter range. Purple and blue areas represent migratory segments that were used by at least 10% of the sampled population.

Pronghorn –

We calculated population-level migration routes for pronghorn from the Pinedale Anticline and Cottonwood Creek study areas (Fig. 5). The Pinedale Anticline migration route included 36 migrations, collected from 20 pronghorn between 2010 and 2011. The Cottonwood Creek migration route included 18 migrations, collected from 13 pronghorn. We note that year-around data were collected for more animals, but they were either non-migratory or nomadic. The population-level migration routes were characterized by a series of stopover sites where pronghorn spent most of their time, connected by movement corridors through which they moved quickly (Fig. 5). Shapefiles of routes were provided to Wyoming Game and Fish Department.

Pronghorn from the PAPA area migrated 10 to 70 miles north. Pronghorn moved north off the Mesa through Trapper's Point. Some pronghorn summered west of Cora, while others occupied areas along Willow Creek to the east of Cora. Other pronghorn migrated further north towards Black Butte, along the Upper Green River, and as far north as Piñon Ridge and Fish Creek Park. Pronghorn from the Cottonwood Creek area migrated 10 to 60 miles north and west. A portion migrated northwest along Muddy Creek and Billy Canyon to summer ranges west of Ryegrass Junction. Others migrated north through the Soapholes, westerly through the Grindstone and Ryegrass, then north to Beaver Ridge. Some pronghorn summered along Beaver Ridge, but others continued north to the South Hoback Rim and as far north as Dell Creek. Because of the relatively low sample sizes for pronghorn, we did not calculate the proportional level of use like we did for mule deer (see Figs. 3 & 4). We anticipate sample sizes will be large enough to do this next year.

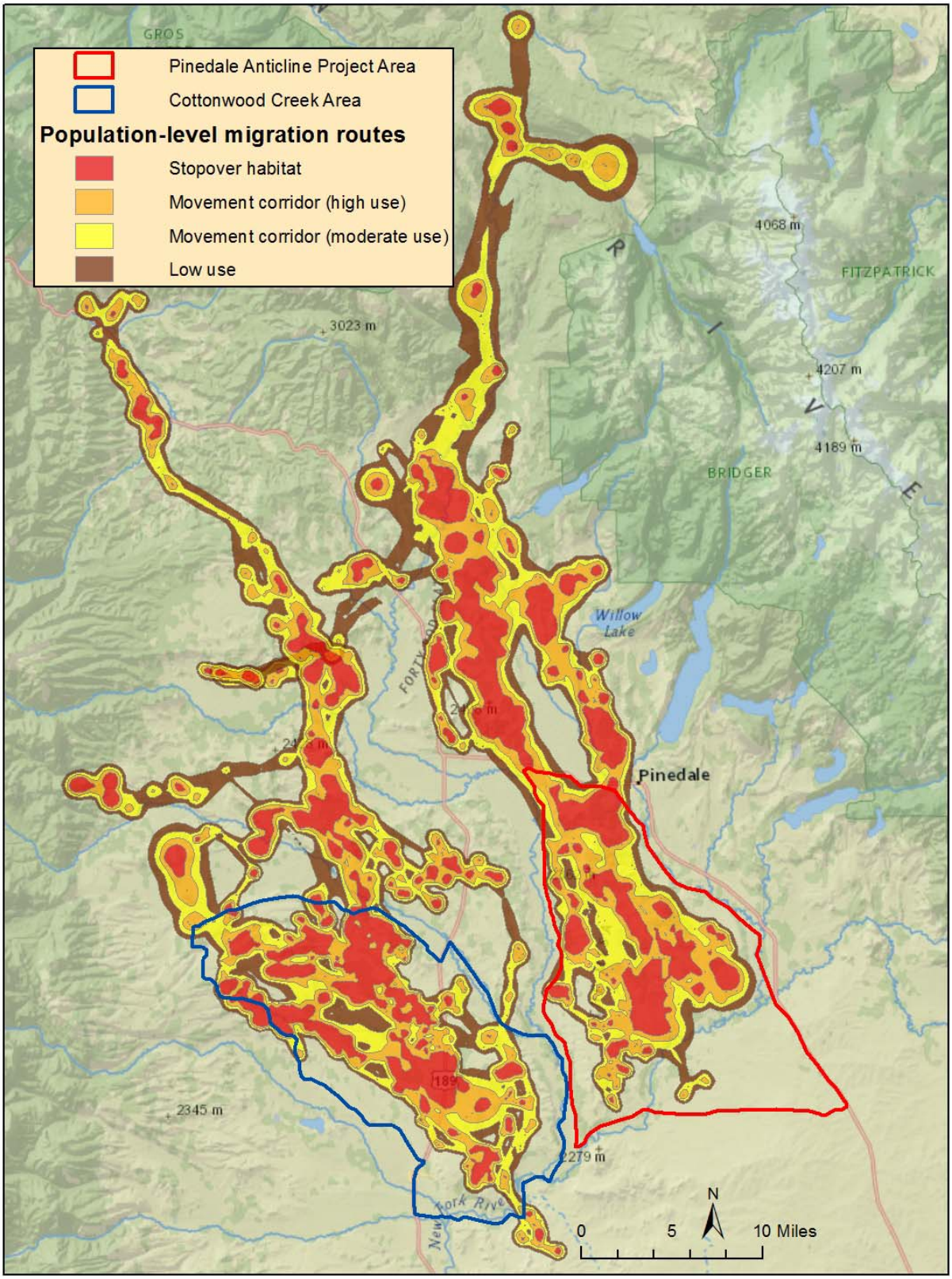

Figure 5. Population-level migration routes of pronghorn from the Pinedale Anticline Project Area (*n*=20) and Cottonwood Creek (*n*=13), 2010 through 2011.

REFERENCES

Horne, J. S., E. O. Garton, S. M. Krone, and J. S. Lewis. 2007. Analyzing animal movements using Brownian Bridges. Ecology 88:2354-2363.

Sawyer, H., M. J. Kauffman, R. M. Nielson, and J. S. Horne. 2009. Identifying and prioritizing ungulate migration routes for landscape-level conservation. Ecological Applications 19:2016-2025.

Sawyer, H. and M.J. Kauffman. 2011. Stopover ecology of a migratory ungulate. Journal of Animal Ecology 80:1078-1087.