SUBLETTE ANTELOPE
BIOLOGICAL RISK AND OPPORTUNITY ASSESSMENT

Wyoming Game and Fish Department
March 2025

Conserving Wildlife
Serving People

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LIST OF ACRONYMS

Assessment - Biological Risk and Opportunity Assessment

BBMM - Brownian Bridge Movement Model

BLM - Bureau of Land Management

CE - Conservation Easement

Corridor - Sublette Antelope Migration Corridor

CRP - Conservation Reserve Program

GPS - Global Positioning System

GTNP - Grand Teton National Park

Herd - Sublette Antelope Herd Unit

KSLA - Known Sodium Leasing Area

Migration Corridor EO - Wyoming Mule Deer and Antelope Migration Corridor Protection Executive Order 2020-1

NEPA - National Environmental Policy Act

NGOs - Non-governmental organization

NPS - National Park Service

NSO - No Surface Occupancy

ORV - Off-Road Vehicle

OSLI - Office of State Lands and Investments

ROW - Right-Of_Way

Sage-Grouse EO - State of Wyoming Greater Sage-Grouse Core Area Protection Executive Order, 2019-3

USDA - U.S. Department of Agriculture

USFS - U.S. Forest Service

USFWS - U.S. Fish and Wildlife Service

WGFC - Wyoming Game and Fish Commission

WGFD - Wyoming Game and Fish Department

WSA - Wilderness Study Areas

WVCs - Wildlife-Vehicle Collisions

WY DEQ - Wyoming Department of Environmental Quality

WYDOT - Wyoming Department of Transportation

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DATA USED FOR THIS ASSESSMENT

This Assessment is informed by the best-available spatial inventories of conservation risks and opportunities that overlap the Corridor. However, errors in calculations and information displayed on maps may be present, including Geographic Information System data from WGFD and numerous collaborators. Primary data contributors include the BLM, Wyoming Department of Environmental Quality, US Department of Agriculture, USDA Natural Resources Conservation Service, and Bridget Teton National Forest. In some cases, complete data inventories were not available. The State of Wyoming and its agencies make no express or implied warranties as to the maps in this report and the data they display. Users of this information should review or consult the primary data and information sources to ascertain the reliability or usability of the information. The State of Wyoming and its agencies assume no liability associated with the use or misuse of this information and specifically retain sovereign immunity and all defenses available to them by law.

EXECUTIVE SUMMARY

The Sublette Antelope Migration Corridor (Corridor) was formally identified by the Wyoming Game and Fish Commission in March 2024 after the Wyoming Game and Fish Department's (WGFD) recommendation to pursue the designation process based on current and anticipated threats to the Corridor. Identification of a corridor may be followed by the development of a Biological Risk and Opportunity Assessment (Assessment), in line with the Wyoming Mule Deer and Antelope Migration Corridor Protection Executive Order 2020-1 (Migration Corridor EO). The Wyoming Game and Fish Commission directed the WGFD to complete this Assessment as the next step in the process to evaluate if designation of this Corridor is warranted. This herd is one of the largest antelope populations in the state, geographically and by population numbers. Individuals migrate between winter and summer ranges, crossing private, state, and federal lands. Migration distances range anywhere from a few miles within the Upper Green River Basin to 165 miles spanning from Grand Teton National Park to Interstate 80 near Rock Springs and Green River. This Corridor stretches across lands in Fremont, Lincoln, Sublette, Sweetwater, and Teton counties.

High, medium, and low-use polygons were developed using the line buffer data analysis method and mapped to highlight the relative use of different parts of the Corridor. Stopovers were delineated by mapping the top 5% of area used by all individuals in the analysis. See Appendix A for a more detailed description of the analysis methods used to delineate this Corridor and stopovers. The Corridor was divided into 10 biologically relevant segments based on evaluation from WGFD managers. Each segment is unique to a geographic area to allow WGFD managers to make site-specific recommendations and organize information in the Assessment. This document identifies primary conservation challenges and opportunities. It also guides conservation actions, in partnership with willing landowners, county governments, state agencies, federal land managers, and conservation cooperators.

The Migration Corridor EO directs WGFD to evaluate the Corridor for potential bottlenecks. Bottlenecks are portions of a migration corridor where animals are considerably physically or behaviorally restricted. These areas can be important for conservation because the potential to sever the corridor is exacerbated at "pinch points." Thirteen bottlenecks have been identified in this Assessment. Each bottleneck is described in detail within the segment, as well as in a Bottleneck Appendix. Finally, the document wraps up with a list of the top six conservation risks and opportunities to consider.

Habitat fragmentation associated with rural residential development and energy and mineral extraction are the most significant threats to the continued functionality of the Corridor. Development can continue to occur within this landscape by minimizing impacts to migratory antelope and the habitats they rely on. Continued close collaboration in designing development projects in the least impactful way as a result of Corridor designation will result in win-win situations for Wyoming. Locating surface disturbance outside of high-use areas, stopover habitats, and bottlenecks allows for multiple uses of the landscape while ensuring the long-term conservation of the Sublette Antelope Corridor. Designating this Corridor empowers companies and local governments to proactively use science and data to make decisions that accommodate a variety of uses on the landscape while protecting the most sensitive areas of the Corridor.

The additional threats to the functionality of the corridor, as identified in this Assessment — including impermeable fences, restricted bottlenecks, invasive species, feral horse management, and recreation — are significant and cannot be overlooked. Addressing habitat fragmentation without concurrently addressing these additional threats will not be sufficient to ensure long-term functionality of the Corridor. While existing conservation protections and practices are currently in place, they alone are inadequate to fully mitigate the challenges facing this

Corridor. Corridor designation would prioritize actions to address these pressing issues, and would help focus resources to ensure that conservation efforts are adequately supported and sustained over the long term.

Landownership within the Corridor extends across a wide variety of management entities with various goals and mandates for land management actions. By implementing the Migration EO, one consistent, science-based strategy will guide management of this Corridor under the guidance of the State of Wyoming. The WGFD recommends designation of the Sublette Antelope Migration Corridor under the authority of the Migration EO to further support antelope conservation and multiple use of this important landscape.

INTRODUCTION

The Wyoming Game and Fish Department (WGFD) recommended designation of the Sublette Antelope Migration Corridor (Corridor) based on current and anticipated threats (2024 Sublette Antelope Migration Corridor Threat Evaluation, Appendix A). The Corridor was formally identified by the Wyoming Game and Fish Commission (WGFC) in March 2024. Post identification of the Corridor, WGFD developed this Biological Risk and Opportunity Assessment (Assessment), in line with the Wyoming Mule Deer and Antelope Migration Corridor Protection Executive Order 2020-1 (Migration Corridor EO). Members of the public have an opportunity to provide comments to WGFD during the Assessment development and to the WGFC at a future Commission meeting. The Assessment will describe risks to the Corridor's functionality and opportunities for conservation.

The Sublette Antelope Herd Unit (Herd) is one of the largest antelope (Antilocapra americana) populations in the state. Individuals migrate distances ranging from a few miles within the Upper Green River Basin up to 165 miles between winter and summer ranges across private, state, and federal lands. The lowest elevation area, located at the north and south ends of the Corridor near the National Elk Refuge and the town of Green River, are around 6,300 feet (1,920 meters). The highest point of the Corridor, where the Corridor crosses the hydrographic divide between the Green River and the Gros Ventre River, is 9,649 feet (2,941 meters). The Corridor stretches across land in Fremont, Lincoln, Sublette, Sweetwater, and Teton counties. Land jurisdictions include the Office of State Lands and Investments (OSLI), Bureau of Land Management (BLM), U.S. Forest Service (USFS), National Park Service (NPS), U.S. Fish and Wildlife Service (USFWS), WGFC-owned land, and private land (see Table 1 and Figure 1). The northernmost portion of the Herd summers in Grand Teton National Park (GTNP), the National Elk Refuge, and Jackson Hole; and winters as far south as Interstate 80 near the towns of Rock Springs and Green River. Other distinct summer ranges include the Bondurant and Upper Green River basins, Waterdog Lakes, and sagebrush steppe habitat throughout the Upper Green River Basin.

Table 1. Land ownership found throughout the Corridor.

	High Use	Medium Use	Low Use	Stopovers	Bottlenecks
BLM	60,109	233,302	1,062,985	218,081	5,376
USFS	38,558	63,702	143,412	16,525	4,251
OSLI	4,249	15,311	70,641	15,297	2,335
Private	20,424	48,495	339,557	56,579	13,247
WGFC	122	1,043	1,921	452	-
Other*	7,081	18,387	96,562	12,384	2,166
Totals	130,542	380,241	1,715,077	319,316	27,375

**"Other" includes Bureau of Reclamation, USFWS, local government, NPS, and bodies of water*

The Herd is one of the largest in the state geographically and by population numbers. The Herd includes Hunt Areas 85-93, 96, 101, and 107 and is managed for a postseason population objective of 48,000 individuals using a limited quota hunting license system. The population grew slightly after 2012 until the unprecedented severe winter of 2022-23, after which the population was estimated at 20,500, which was a 30-year low and 57% below objective (see Figure 2).

Mycoplasma bovis (M. bovis) is a newly emerging

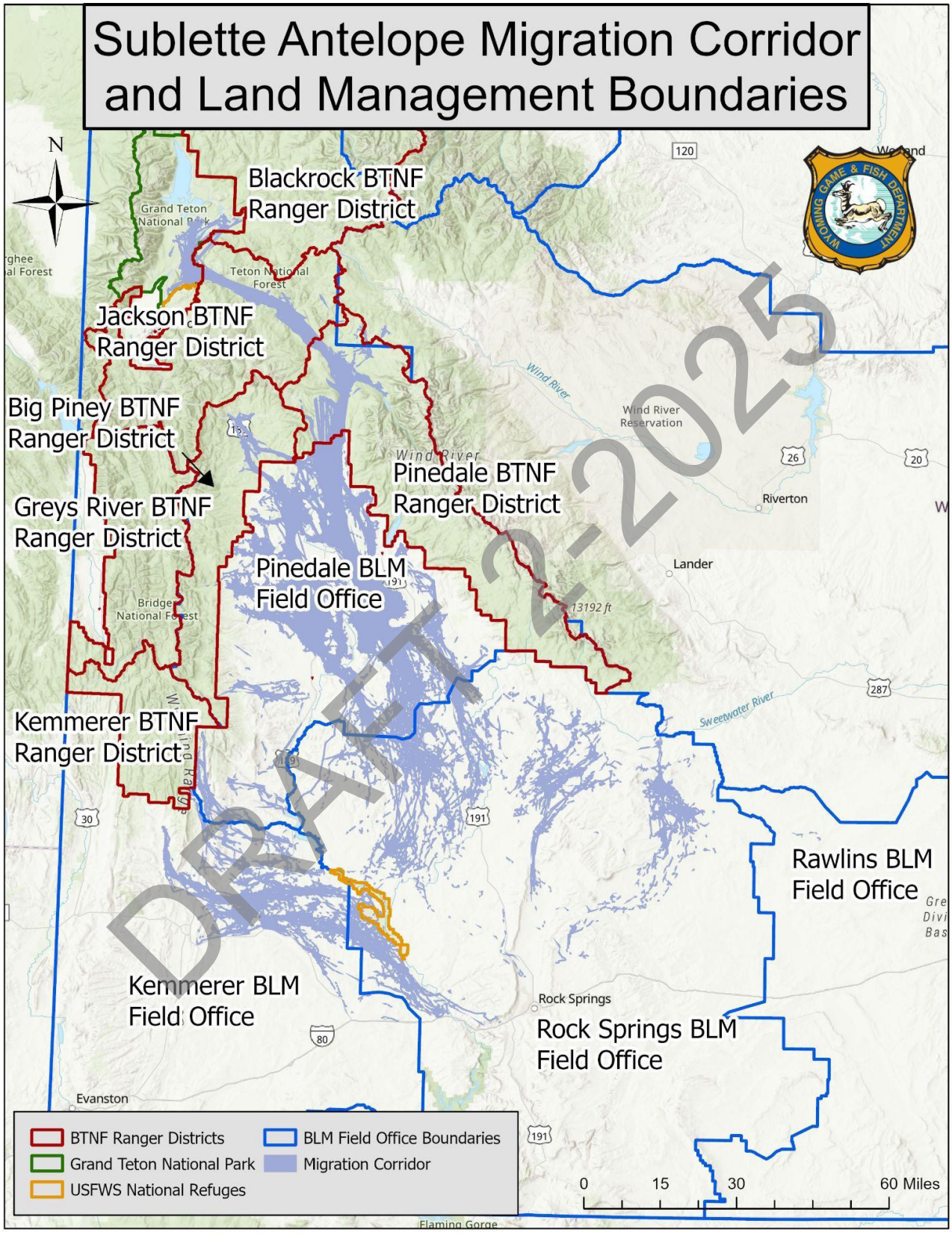

Figure 1. BLM Field Offices, BTNF Ranger Districts, and other federal land management areas.

bacterial disease in Wyoming antelope. M. bovis is a known disease of cattle and bison, and occasionally observed in white-tailed deer and mule deer. This disease was first recorded in antelope in February 2019 in northeast Wyoming near Gillette. A substantial outbreak was then documented during the 2022-23 winter in the Sublette antelope herd, leading to widespread mortality in conjunction with the effects of severe winter conditions. The recent population reductions due to disease and severe conditions during the 2022-23 winter highlighted the importance of Crucial Winter Range habitat and permeable corridors, as animals that migrated further south generally experienced increased survival versus animals on the more northerly winter ranges.

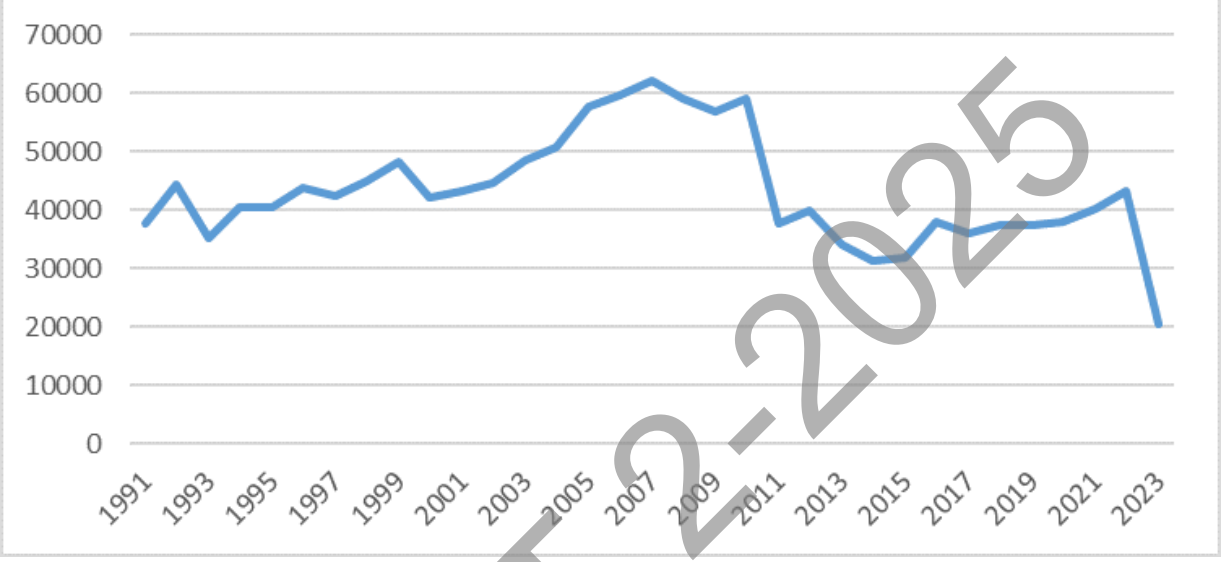

Figure 2. Sublette Antelope Herd population estimates, 1991-2023.

METHODS

Analysis

The Herd is one of the most data-rich ungulate populations in the world with nine different Global Positioning System (GPS) collar studies, including 613 collared individuals from 2002-22 (see Table 2). The Corridor was developed based on 415 individual antelope that represented 806 migration sequences (one seasonal movement) between distinct seasonal ranges. Based on a combination of GPS collar data and field knowledge, WGFD estimates more than 75% of the Herd displayed migratory movements whereas the others demonstrated either resident or nomadic behavior without discernible seasonal movement between distinct winter and summer ranges (Appendix A). Sampling efforts have not been uniform over time, therefore data was divided into seven sub-herds for analyses to reduce effects of sampling intensity. For example, the North Segment of the herd has the greatest number of collared individuals throughout the 20 years of GPS collar studies, but it supports the smallest percentage of the herd by population numbers. Line buffer (300 meters) and Brownian Bridge Movement Model (BBMM) analyses were conducted for each sub-herd, then merged to create final corridor and stopover polygons throughout the Herd.

Stopovers for the Sublette, Baggs and Platte Valley Mule Deer (Odocoileus hemionus) herd units were calculated as the top 10% of utilization distributions within the migration footprint (i.e., low use corridor). Data analyses have demonstrated antelope migration corridors tend to be more spread out with generally less overlap than mule deer, resulting in large, and low-use footprints relative to the area of the high-use corridor. Careful examination of stopover location and size using different cut-offs directed managers to use a value of 5% (as opposed to 10%) for this Herd. This reduced the stopover polygon by half and provided a more representational description of what managers have observed for the individuals in this Herd.

High, medium, and low use polygons were mapped to highlight the relative use of different parts of the Corridor. These polygons are based on 'overlapping' each individual migration footprint within each sub-herd, then calculating the percentage of the sub-herd utilizing an area of the landscape. More than 20% of the collared individuals in each sub-herd need to overlap migration footprint polygons to be considered high-use. At least 10% have to overlap for medium-use, and at least two collared individuals have to overlap in their migration footprint polygon to be considered low-use. These distinctions provide managers with an indication of the proportion of the sub-herd using an area during migration and areas that have high concentrations of migrating animals. Low-use areas are not necessarily used by less individuals, but the individuals which use the low-areas are less concentrated.

Table 2. GPS Collar Studies conducted in the Herd contributed to Corridor delineation.

Years	Project	Objective
2002-2003	Kemmerer	Fences and roads as barriers
2003-2004	Grand Teton NP	Jackson Hole movements
2005-2010	Pinedale Anticline	Effects of natural gas development
2009-2017	Pinedale Anticline 2	Effects of natural gas development
2010-2013	Grand Teton NP 2	Jackson Hole movements
2012-2013	Jack Morrow Hills	Movement in the Red Desert
2017-2018	I-80	Influence of climate and I-80
2018-2020	Sweetwater Solar	Effects of solar energy development
2020-2024	Distribution Gaps	Fill in areas between previous studies

Segments

The Corridor was divided into 10 biologically relevant segments based on evaluation from WGFD managers (see Table 3 and Figure 3). Each segment is unique to the geographic area to allow WGFD managers to make site-specific recommendations regarding peak timing of antelope use within the segment, referred to as the "migration period" in the Migration Corridor EO (see Table 4). By dividing the Corridor into Segments, WGFD is able to organize information in the Assessment and focus recommendations on specific sections of the Herd. Peak timing of use was determined by analyzing when collared antelope individuals used a specific segment of the Corridor.

Table 3. Description of Sublette Antelope migration Corridor segments.

Segment Name	Description	WGFD Region	Acres
North	BTNF and areas in Jackson Hole	Jackson-Pinedale	168,413
Bondurant	BTNF and dispersed private land in the Bondurant Basin	Pinedale	22,733
Foothills	North of Pine Creek and US Hwy 191, west to the Green River and north of N. Piney Creek and south of the Bondurant Segment	Pinedale	387,663
East of 191	South of Pine Creek, east of US Hwy 191 and north of Farson	Pinedale	106,383
Central	East of the Green River, south and west of US Hwy 191, and north of Rock Springs	Pinedale-Green River	443,991
Calpet	South of N. Piney Creek, west of the Green River and north of LaBarge Creek	Pinedale	27,597
Fontenelle	South of LaBarge Creek, west of the Green River and north of US Hwy 189	Green River	118,971
Southwest	South of US Hwy 189, west of the Green River and north of I-80	Green River	240,078
East of Farson	South of the East of 191 Segment including Prospect Mountains and Jack Morrow Hills, east of US Hwy 191	Pinedale-Green River	110,409
Red Desert	East of US Hwy 191, north of I-80 including Leucite Hills , Antelope Hills and Alkali Basin	Green River	88,838

Table 4. Dates of peak timing of use in each segment.

Segment	Spring Start	Spring End	Fall Start	Fall End
North	May 1	June 15	Oct. 1	Nov. 15
Bondurant	May 1	May 31	Oct. 1	Oct. 31
Foothills	April 1	May 31	Oct. 1	Oct. 31
East of 191	March 1	April 30	Oct. 1	Nov. 30
Central	March 1	April 30	Oct. 1	Nov. 30
Calpet	April 1	April 30	Oct. 1	Oct. 31
Fontenelle	March 1	April 30	Oct. 1	Oct. 31
Southwest	March 1	April 30	Oct. 1	Nov. 30
East of Farson	March 1	April 30	Oct. 1	Nov. 30
Red Desert	March 1	April 30	Oct. 1	Nov. 30

Bottlenecks

Bottlenecks are defined as "any portion of a mule deer and antelope migration corridor where animals are significantly physically or behaviorally restricted" by the Migration Corridor EO. When the terrain allows, ungulates fan out during migration, covering a wide swath of land. In bottlenecks, however, landscape features, development, or other topographic constraints limit the width of the movement corridor. These narrow portions are typically high priority for conservation efforts because the potential to sever the corridor or otherwise disturb animals is exacerbated at these "pinch points" (Kauffman et al. 2018, Hilty et al. 2020). WGFD identified bottlenecks by highlighting sections of the Corridor where ungulates move through a geographically constrained space (see Figure 4). These areas are delineated by using expert knowledge of managers and review of GPS collar data. Areas in the Corridor that have been identified as bottlenecks are associated with highway wildlife crossings, river crossings, unsuitable forested habitat, constricting topography, and existing anthropogenic disturbance. These bottlenecks will be discussed in detail within each of the segments where they occur, are mapped in more detail in the Bottleneck Appendix B, and may be viewed through the interactive mapping application on the WGFD Movement Matters website.

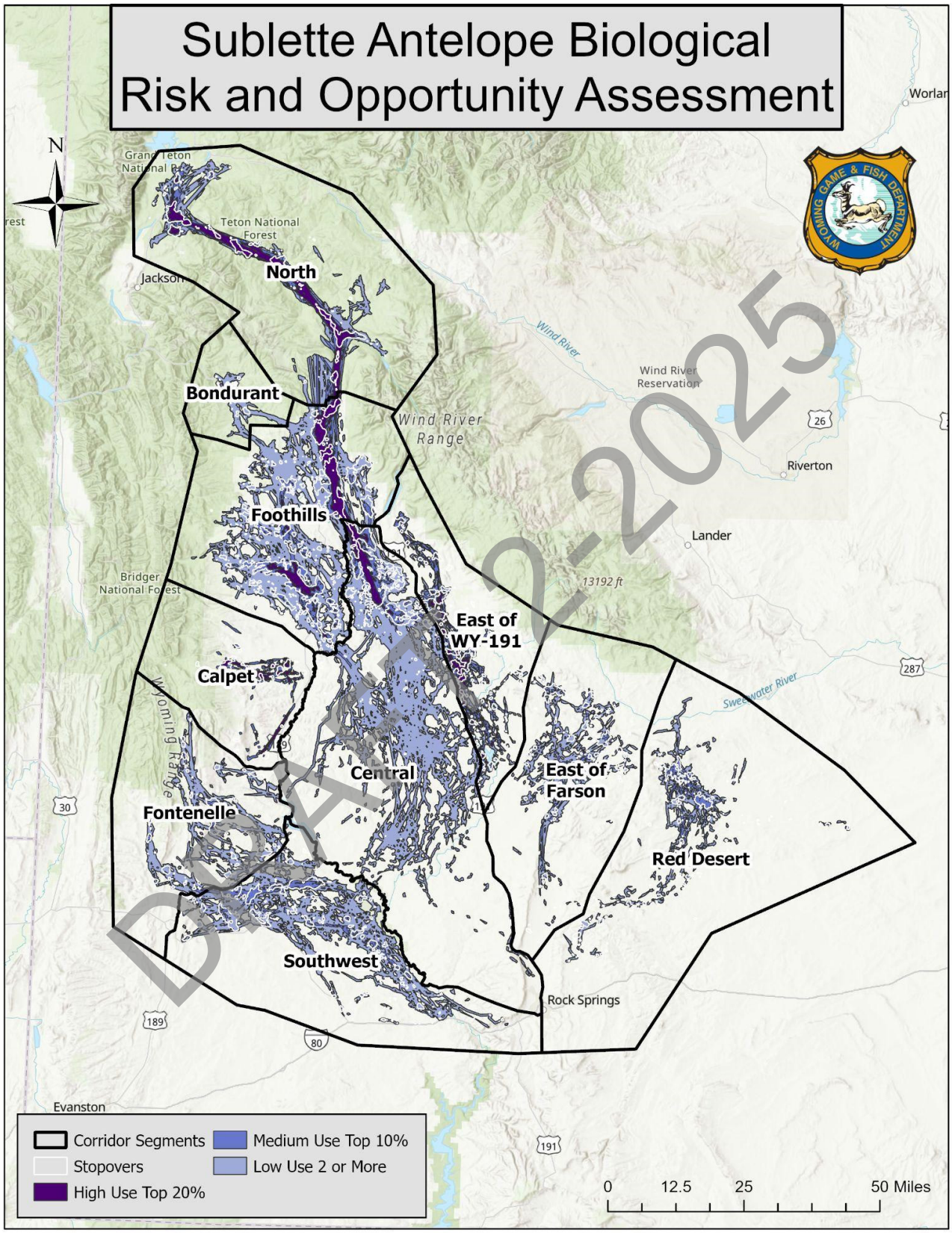

Figure 3. Individual segments throughout the Corridor.

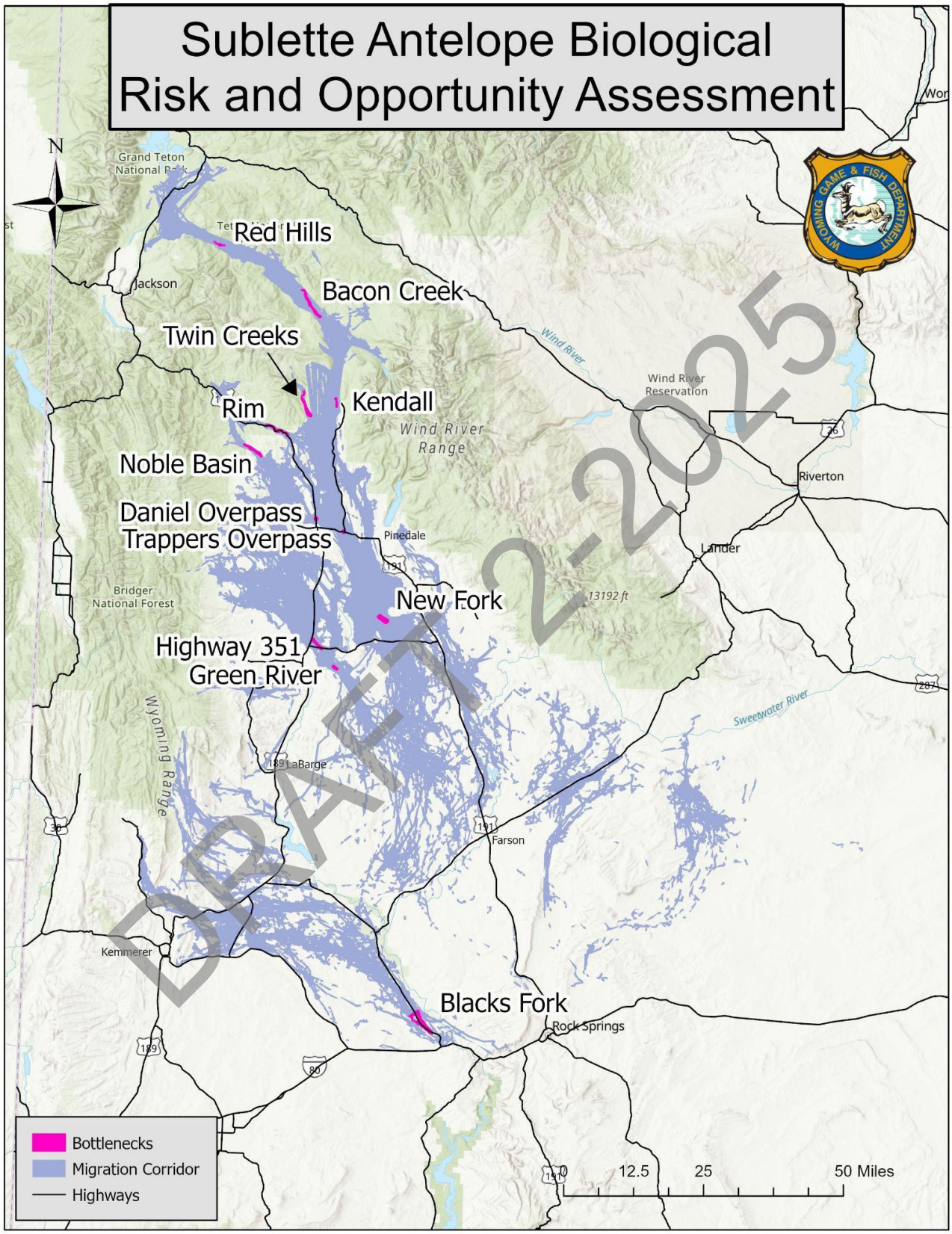

Figure 4. Bottlenecks

PROTECTIONS COMMON THROUGHOUT THE CORRIDOR

Migration Corridor Protections

The Migration EO details Wyoming's strategy for managing designated migration corridors and their habitats. Within designated corridors, areas of varying use are classified as bottlenecks, stopovers, high use, medium use, and low use. The Migration EO stipulates that no new surface disturbance or seasonal human presence will be permitted in bottlenecks. Surface disturbance and human activity during migration should be avoided in all stopover areas that overlap with high-use portions of a corridor. In high-use areas that are not classified as stopovers, surface disturbance and human presence should be limited in order to ensure functionality of a corridor. Medium- and low-use areas are places where development can occur but minimizing disturbance is still the goal to ensure functionality of the corridor. The Migration EO provides direction that development and use should occur outside of a designated corridor, whenever possible. These measures do not apply to private lands and valid, existing rights are recognized. Inside corridors, state regulatory agencies should support the continued functionality of designated migration corridors by conditioning permits to avoid and minimize impacts from development or use allowed within the corridor. A portion of this Corridor also overlaps with the designated Sublette Mule Deer Migration Corridor (see Figure 5).

Big Game Crucial Range

Big Game Crucial Range describes geographic areas or habitat components that play a substantial role in the ability of a population to maintain and reproduce over the long-term. In general, Crucial Winter and Winter-Yearlong Range should be available and intact to sustain populations that align with herd management objectives. Within this Herd, most of the antelope Crucial Range includes sage steppe habitats where shrubs and grasses provide critical winter forage (see Figure 6). To minimize disturbance to wintering ungulates, WGFD recommends public land-management agencies minimize development activity in designated elk (Cervus canadensis), moose (Alces alces), bighorn sheep (Ovis canadensis), mule deer, and antelope Crucial Winter Range and Crucial Winter-Yearlong Range from Nov. 15-April 30. These reductions to disturbance result in additional timeframes where antelope are provided with protections during the winter season.

Sage-Grouse Core Area and Winter Concentration Area

The current State of Wyoming Greater Sage-Grouse Core Area Protection Executive Order, 2019-3 (Sage-Grouse EO), was issued by Governor Mark Gordon in August 2019. The Sage-Grouse EO provides a process for managing development in sage-grouse habitat and is the primary regulatory mechanism for sage-grouse conservation in the state. The Sage-Grouse EO outlines a Core Area Protection strategy, implemented by state agencies, which prioritizes the maintenance and enhancement of habitat and populations within Core Population Areas, Connectivity Areas, and Winter Concentration Areas — a combined area that supports 83% of the sage-grouse population in the state. There is substantial overlap of the sage-grouse Core Area with this Corridor (see Figure 7). Activities within these areas should avoid impacts first, minimize unavoidable impacts second, and apply mitigation when impacts cannot be avoided or fully minimized. Activities in Core Population Areas and other Sage-Grouse EO delineated habitats avoid negative impacts through compliance thresholds and stipulations outlined in the Sage-Grouse EO. Avoidance and minimization can be

spatial and temporal. Valid existing rights are recognized and state-permitted activities are allowed subject to the terms, conditions, and authorizations specified for the activity. Protections afforded to sage-grouse have been documented to serve as a mechanism to provide protections to other ungulates in the same landscape (Copeland et al. 2014).

No Surface Occupancy

No Surface Occupancy (NSO) is a BLM-designation that prevents surface-disturbing activities in specific areas. Lands with this designation may include wilderness study areas, culturally significant, or sensitive areas for wildlife. Such lands remain open to fluid mineral leasing, assuming leases can be developed by directionally or horizontally drilling from adjacent lands without NSO limitations.

Conservation Easements

Conservation Easements (CE) are voluntary contracts between a landowner and a conservation organization or land trust. While the specifics of individual agreements vary, CEs generally ensure that encumbered private land will be maintained as open space. This typically includes transferring rights to subdivide a property to the conservation organization or land trust that holds the CE. Terms of the CE typically allow the landowner to continue activities that are compatible with open space and conservation values, including agricultural practices. Of the 339,557 acres of private land in the designated Corridor, 68,676 acres (20%) are protected under CEs. The majority of these acres (65,271) are in the Foothills Segment. As the demand to develop private land in the Intermountain West increases, CEs offer an important tool to protect open space and ensure landscape connectivity.

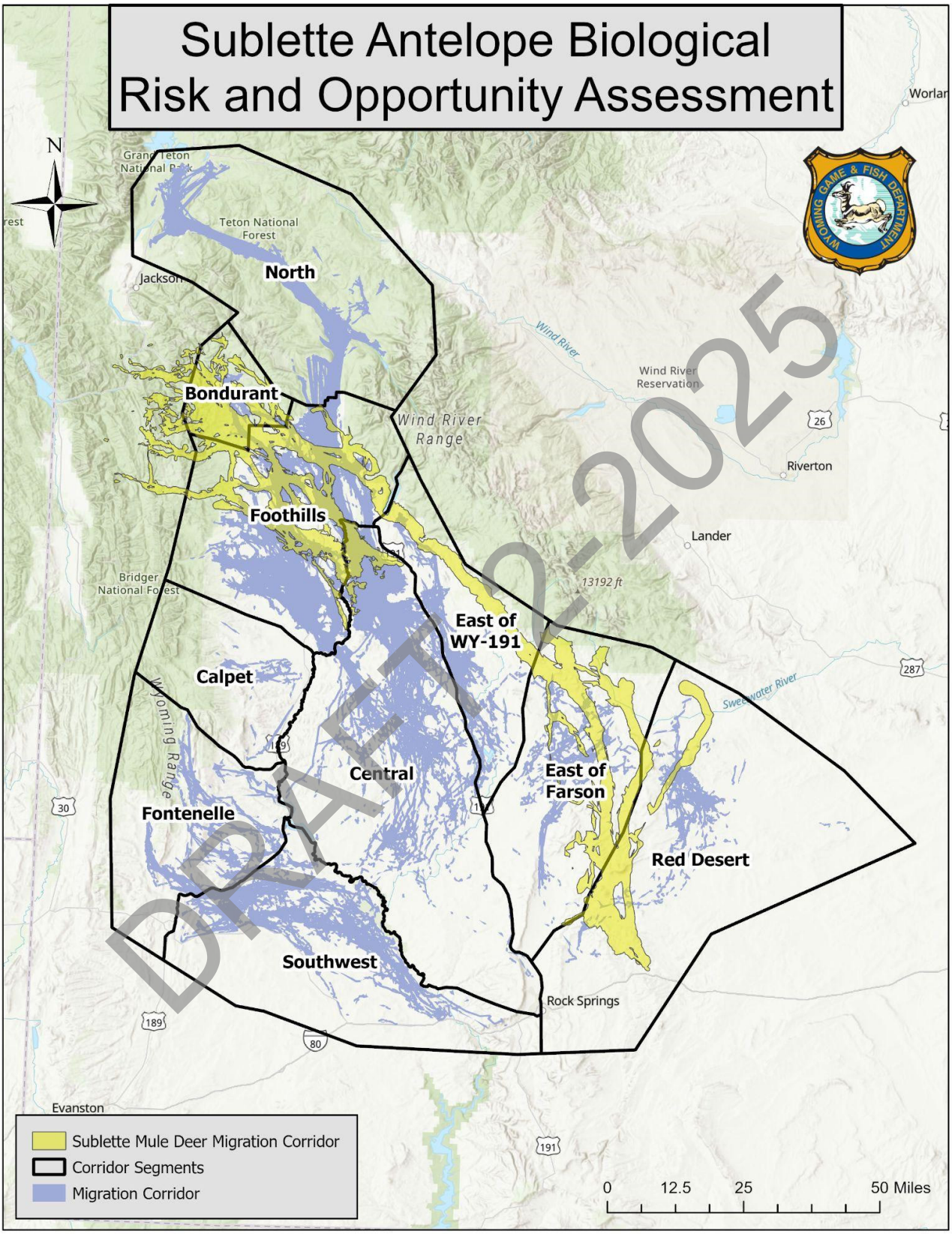

Figure 5. Sublette Mule Deer Migration Corridor.

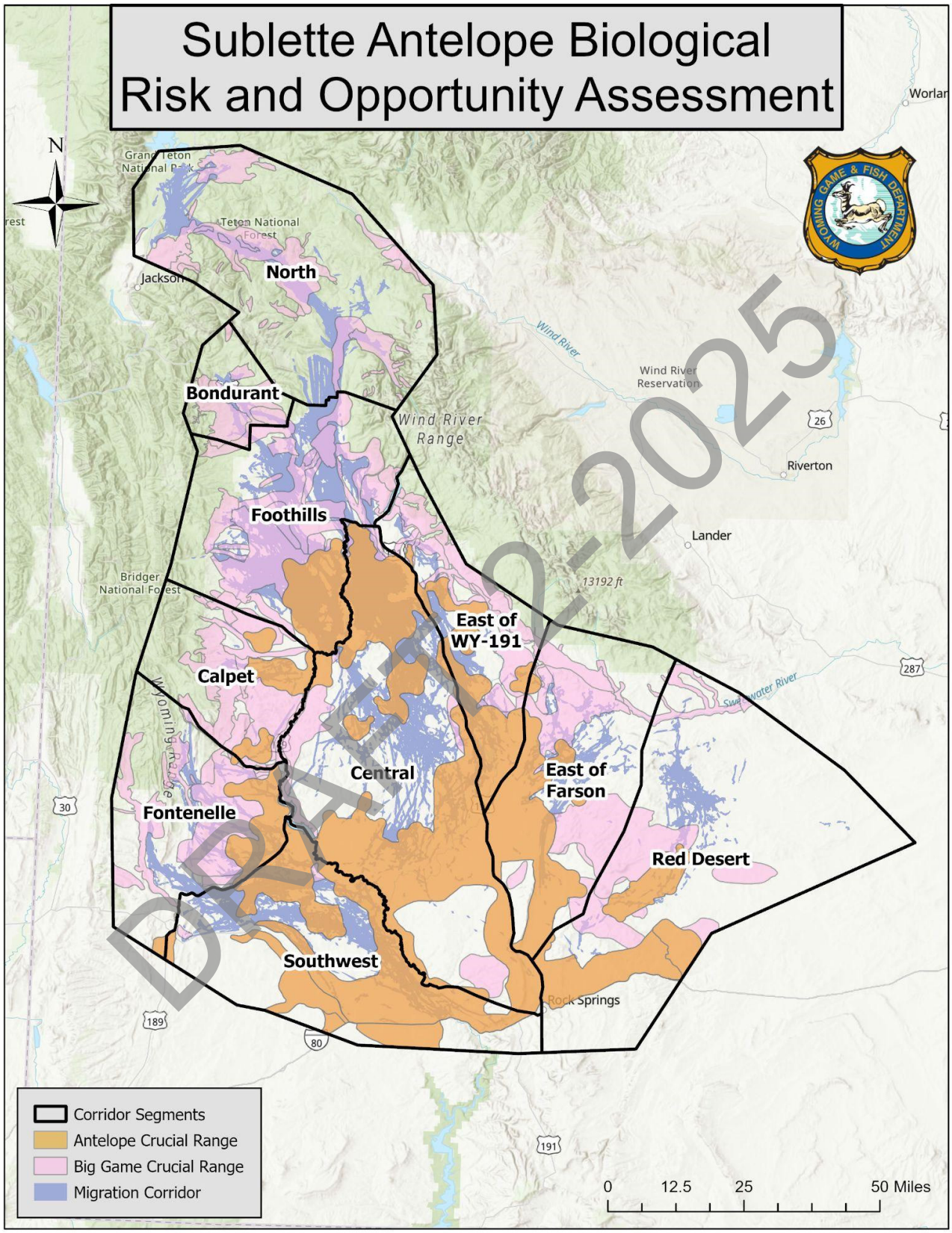

Figure 6. Antelope and other Big Game Crucial Ranges.

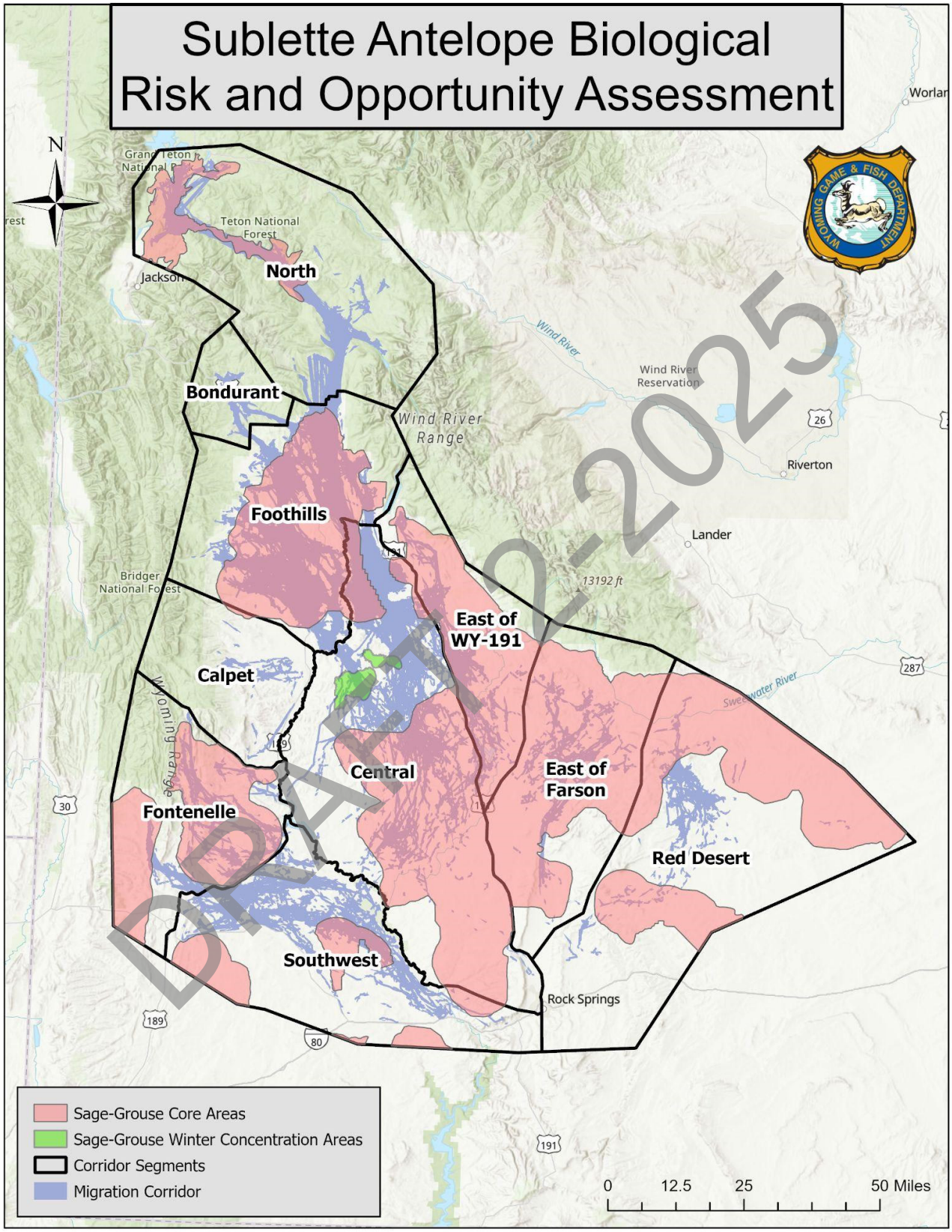

Figure 7. Sage-grouse Core and Winter Concentration Areas

THREATS COMMON THROUGHOUT THE CORRIDOR

Roads and Highways

Roads and highways may impede daily and seasonal wildlife movements, exclude and restrict wildlife access to resources, fragment habitat, and increase the risk of wildlife-vehicle collisions (WVCs). Additionally, roads can isolate wildlife populations, alter population distributions, and reduce species abundance (Epps et al. 2005, Frair et al. 2008, Fahrig and Rytwinski 2009, Benítez-Lopéz et al. 2010). A road, or system of roads, may prompt behavioral responses such as avoidance or tolerance behaviors based on a threshold (Frair et al. 2008, Beyer et al. 2013). For example, road density may not elicit behavioral responses in elk and moose until a threshold is exceeded (Frair et al. 2008, Beyer et al. 2013). Similarly, elk avoid highways as traffic volume increases but may use habitat near the highway when traffic volume is reduced (Gagnon et al. 2007). Wildlife may safely cross roads with low traffic volume, especially if right-of-way (ROW) fencing is absent or a wildlife-friendly fence occurs adjacent to roadways (Sawyer et al. 2016). However, multiple lane roads with high traffic volumes, such as highways and interstates, are typically bordered with ROW fencing and often function as some level of barriers to many wildlife species (Sawyer et al. 2014, Seidler et al. 2014). Once an animal has successfully navigated the ROW fencing, it becomes increasingly at risk of WVCs. WVCs pose a substantial threat to motorist safety and wildlife populations. In the United States, an estimated 1-2 million WVCs occur annually (Huijser et al. 2008), including an annual average of 7,656 WVCs in Wyoming (Riginos 2022). Major factors influencing collision risk include wildlife density, traffic speed and volume, wildlife habitat resource availability along roadways, and temporal changes in wildlife and motorist behaviors (Gunson et al. 2011, Rea et al. 2014, Coe et al. 2015, Niemi et al. 2017, Colino-Rabanal et al. 2018, Laliberté and St-Laurent 2020). Understanding why, when, and where WVCs occur is essential to developing effective mitigation measures.

Common mitigation practices to reduce WVCs include wildlife warning signs, speed limit reductions, reflectors, game-proof fences, and wildlife crossing structures (Riginos et al. 2013, van der

Ree et al. 2015). Wildlife crossing structures, such as underpasses or overpasses, are increasingly used to reduce WVCs and maintain habitat connectivity (Huijser et al. 2008, Sawyer et al. 2012, Smith et al. 2015, Sawyer et al. 2016, Gilhooly et al. 2019). These structures, combined with game-proof fencing, effectively and drastically reduce WVCs (McCollister and Van Manen 2010, Sawyer et al. 2012, Huijser et al. 2016). Wildlife underpasses are easier and significantly cheaper to construct compared to overpasses. Antelope generally prefer to use overpass structures due to increased line of sight.

The placement of wildlife crossing structures is an effective mitigation strategy. Managers require extensive information regarding migration routes, species-specific preferences, and financial costs to make informed decisions on when and where wildlife crossing structures should be installed on the landscape (Coe et al. 2015, Sawyer et al. 2016, Caldwell and Klip 2020). GPS movement data can facilitate the selection of specific locations in the Corridor where WVCs are most frequent. Given the financial cost of wildlife crossing structures, less expensive mitigation measures (e.g., wildlife warning signs, speed limit reductions, ROW fence modifications, mowing ROW vegetation, etc.) should be utilized when possible. Restoring habitat connectivity and Corridor functionality requires effective collaborations with diverse stakeholders including Wyoming Department of Transportation (WYDOT), private landowners, conservation districts, federal land management agencies, non-governmental organizations (NGOs), and county governments.

A great deal of work has been completed to make highways in this Corridor safer for antelope over the last 15 years (see Figure 8). The most substantial project, overpass installation at Trappers Point, was completed in 2013 and provides two structures for antelope to cross U.S. Highway 189-191 west of Pinedale. The Dry Piney wildlife crossing project was completed in 2023 and included a new arch design underpass which has now been documented to successfully accommodate the passage needs of antelope in a below-grade structure. Several projects have installed additional paired gates in ROW fencing to improve passage by antelope, including efforts along Wyoming Highway 28 east of Farson, Wyoming Highway 351 southwest of Boulder, U.S. Highway 191 north of Farson and U.S. Highway 189 north of Big Piney. Gates are left open seasonally during migration to reduce WVCs. ROW fence modifications have removed woven wire and increased clearance under the bottom wire in several areas within the Corridor, including on Wyoming Highway 28 east of Farson and U.S. Highway 189 north of Daniel.

Fences

Physical barriers on the landscape, such as fences, complicate animal movement and migrations. Fences are a dominant feature across the West and can be both impermeable and semi-permeable barriers impeding daily and seasonal wildlife movements. Fencing can exclude or restrict access to crucial resources (e.g. high-quality forage, water, seasonal ranges, and escape from predators), leading to population declines (Spinage 1992, Bolger et al. 2008, Harris et al. 2009, Sawyer et. al 2013, Jakes et al. 2018). Animals attempting to navigate fences often expend substantial energy when they are temporarily entangled or searching for a place to cross (Jakes et al. 2018, Seidler et al. 2018). Over time, increased stress and energy expenditure may reduce overall individual fitness and increase mortality rates (Jakes et al. 2018).

In addition to impeding wildlife movement, fences also increase the risk of entanglement and direct mortality (Harrington and Conover 2006, Rey et al. 2012). While there are many different fence types, woven-wire fence with a single strand of barbed wire pose the greatest risk of mortality to ungulates (Harrington and Conover 2006). Ungulates attempting to cross this type of fence often become entangled between the barbed wire and stiff, woven wire (Paige 2012), reducing the animal's ability to free itself. Furthermore, juveniles are often separated from their mothers when attempting to cross woven-wire fences and experience an increased

risk of predation and starvation (Harrington and Conover 2006). As anthropogenic disturbances continue to increase on the landscape, integration of wildlife-friendly fencing is necessary to maintain habitat connectivity in the migration corridor.

Large-scale wildlife-friendly fence conversion is an important tool to mitigate wildlife movement barriers (Paige 2012). Converting hazardous fences in migration corridors to wildlife-friendly specifications will reduce fence entanglements, mortalities, and animal energy expenditure while increasing overall habitat connectivity. Various fencing modifications such as incorporating a smooth, bottom wire, raising the bottom wire/lowering the top wire, converting woven wire to wire strands, installing pole-tops along choke-points, and using wood stays improve permeability for wildlife while maintaining livestock confinement (Paige 2012). Wildlife crossing structures have also been installed in current fences as a more cost-effective strategy to facilitate movement in known places preferred for use by wildlife. These crossing structures commonly include an "X-style" gate or pipe gate that still confine livestock and provide several points of easier passage for wildlife, even when snow depths provide challenges for crossing wildlife-friendly fences. Conversion to wildlife-friendly fence specifications has been successful in increasing passage among populations of antelope, white-tailed deer (Odocoileus virginianus), mule deer and elk (Burkholder et al. 2018, Jones et al. 2018, Jones et al. 2020).

Strategic placement of fence modifications are just as important as the modification itself (Harrington and Conover 2006, Paige 2012, Burkholder et al. 2018). Fence conversions should be prioritized in areas where the risk of mortality is the highest, such as areas with high densities of ungulates, areas where ungulates frequently cross fences, and near water sources or other natural concentration points (Harrington and Conover 2006). Throughout the Corridor, tens of thousands of miles of fencing are used to delineate land ownership and manage livestock and other resources. Sublette County alone has documented more than 16,000 miles of fences on the landscape.

To address this concern, a coalition of partners including the WGFD, Natural Resources Conservation Service, Sublette County Conservation District, BLM, private landowners, other agencies and NGOs have worked collaboratively to prioritize fence modifications over the last 10 years (see Figure 9). In Teton County, volunteers with the Jackson Hole Wildlife Foundation have worked with GTNP, BTNF and private landowners to remove or modify more than 200 miles of fence since 1996, much of which is within the Corridor. Beginning in 2012, the Green River Valley Land Trust (currently the Green River Valley Program of the Jackson Hole Land Trust) converted nearly 200 miles to wildlife-friendly standards with antelope connectivity as a primary objective. Combining the Land Trust's efforts with accomplishments spearheaded by the Upper Green Fence Initiative over the last five years, more than 700 miles of fence have either been converted, modified, or removed for safer wildlife passage within this Corridor.

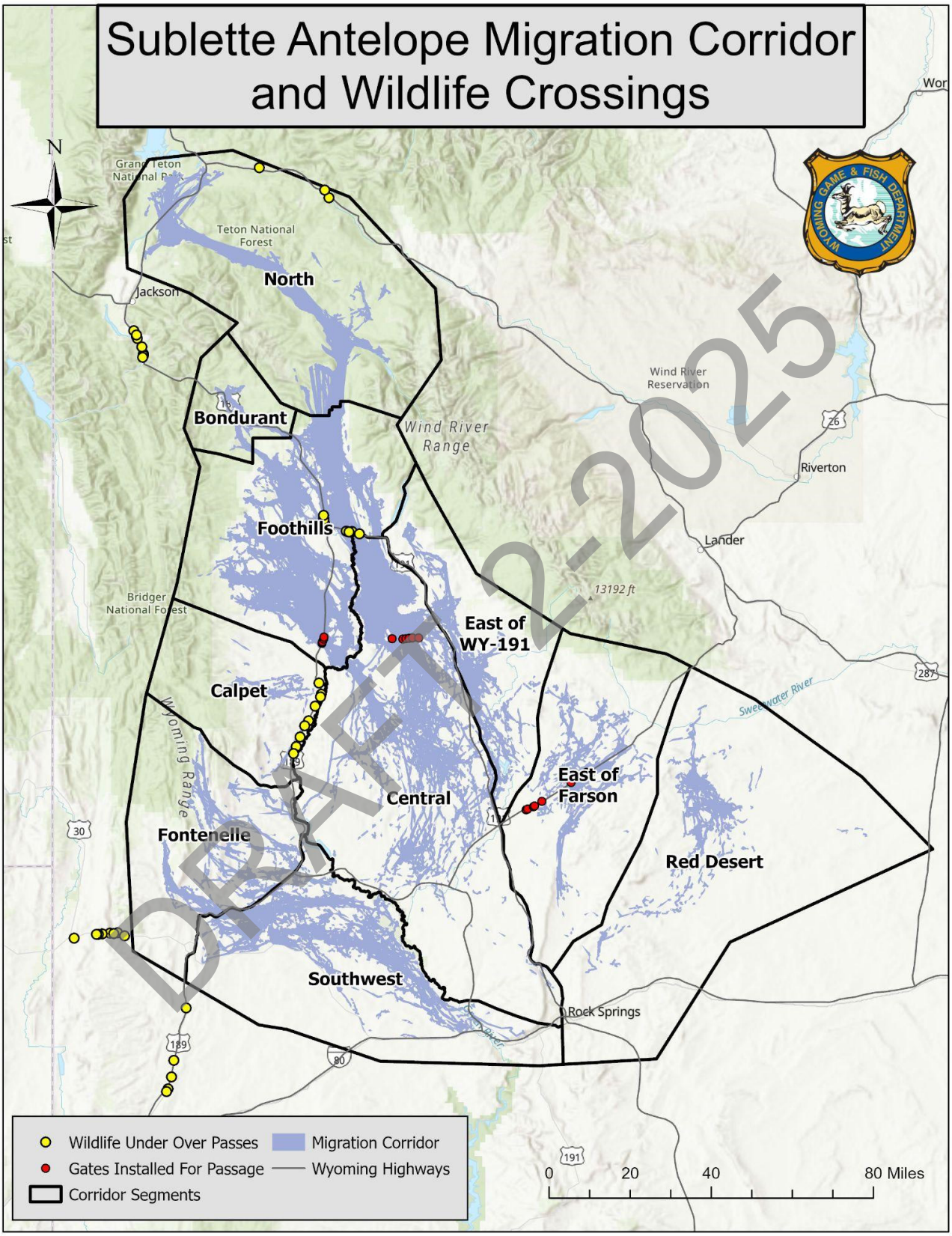

Figure 8. Wildlife crossing projects and ROW fence gates installed.

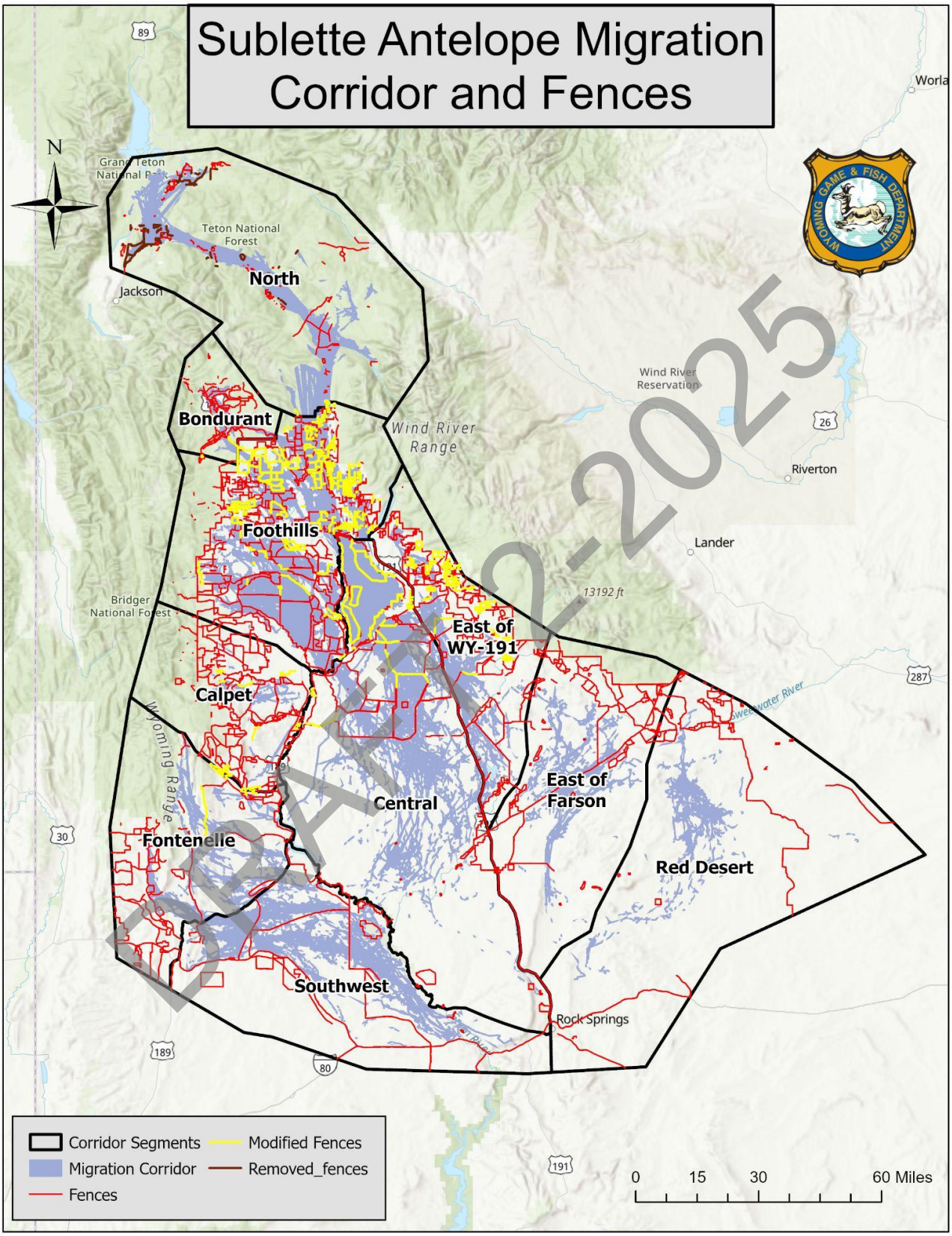

Figure 9. Existing fence locations and completed wildlife friendly modified fences.

Rural Residential Development

The West has experienced some of the highest rates of human population growth in the country over the last 10 years, and Wyoming is no exception (Vias and Carruthers 2005, Kauffman et al. 2018), with Sublette County increasing by 139% and Teton County growing 382% from 1970-2023 (U.S. Census Bureau, n.d.). In many places, low-density housing development has outpaced other forms of land use (Brown et al. 2005). Low-density housing has a dispersed arrangement on the landscape, close proximity to undeveloped land, and high overlap with preferred wildlife habitats. People are drawn to the same biological and physical characteristics as wildlife, including valley bottoms and riparian areas that provide essential resources for migrating wildlife (Hansen et al. 2005). Residential subdivisions and corresponding infrastructure can negatively affect animal behavior and demography (Johnson et al. 2017, Polfus and Krausman 2012), alter plant communities, increase human-wildlife conflict, and reduce available management options (Wyoming Game and Fish Department 2017). In western Wyoming, mule deer increase their movement speed through development and decrease the amount of time spent in stopovers that included exurban housing (Wycoff et al. 2018). This response decreases the foraging benefits of migration and risks animals arriving on seasonal ranges in suboptimal condition. Rural residential development, especially on winter range, has been linked to decreased recruitment, with twice the magnitude of effect on populations than other more commonly considered factors like weather (Johnson et al. 2017).

Energy Development: Oil and Gas, Renewables, Transmission Lines

As human populations grow, the demand for energy production continues to increase. While the energy industry is a major contributor to Wyoming's economy, the impacts associated with energy development can affect antelope population dynamics and migration (Sawyer et al. 2019). The Corridor overlaps several large-scale energy developments including active oil and gas fields, trona mines and associated processing facilities, and one solar facility.

As part of the Wyoming Department of Environmental Quality (WY DEQ) Industrial Siting Division permitting process, proponents of large industrial developments consult with WGFD to assess wildlife considerations. Similarly, most large-scale renewable energy projects are reviewed through a county permitting process, whereas some counties require consultation with WGFD. In accordance with the Memorandum of Understanding between WGFD and BLM (WY-933 Section 5(g)), BLM will request comments from WGFD on proposed federal oil and gas leases. Oil and gas leases on OSLI parcels also are reviewed by WGFD for wildlife concerns. As a result, WGFD evaluates wildlife concerns when state and federal permitting is required or when federal funding is used to support a project. WGFD offers recommendations and guidance based on the proposed energy development type and the existing wildlife resources within the project area. Compliance with WGFD-provided recommendations and guidance is voluntary, unless otherwise stipulated by a permitting agency or entity (e.g., Governor's Executive Order).

The WGFC Ungulate Migration Corridor Strategy specifies a case-by-case approach to recommendations on state and federal surface projects. The goal of this policy is not to exclude energy development, nor is exclusion necessary to maintain the function of migration corridors. Oil and gas surface occupancy within the Corridor may be permitted by the land management agency if a conservation plan detailing adequate avoidance, minimization, mitigation, and/or restoration is developed by the project proponent. Maintaining habitat function and achieving no substantial declines in species distribution or abundance are key components to WGFD input to project proponents. This Biological Risk and Opportunity Assessment may be used as a tool to identify where additional review and coordination is necessary to address Corridor con-

cerns and develop project-specific solutions.

The behavioral effects of energy development on antelope can be long term and, as such, energy development mitigation measures should match the duration of that impact (Sawyer et al. 2017). Onsite mitigation is the optimal method of minimizing energy development impacts and could be most beneficial to species that exhibit fidelity to their seasonal ranges and migration routes, such as antelope (Garrott et al. 1987, Monteith et al. 2014). If energy development does occur, onsite mitigation measures should be prioritized. If effective onsite mitigation is not possible, offsite mitigation efforts should be focused within the herd unit that is being impacted.

Oil and Gas

The Corridor overlaps 61 oil and gas fields that have at least one well (Wyoming State Geological Survey, n.d.), and many parts of the Corridor are classified by the BLM as having "high" oil and gas development potential. The highest oil and gas potential is in the central and southwest portions of the Corridor, which correspond with historical and existing oil and gas production. The BLM coordinates with WGFD prior to approving federal oil and gas operations (such as an Application for Permit to Drill) located in designated corridors. OSLI lands in the Corridor could experience future increases in oil and gas development if demands increase. If a parcel is wholly or partially within a designated migration corridor, stipulations requiring compliance with the Migration Corridor EO are included in the lease agreement.

Roads, compressor stations, fences, and other infrastructure associated with oil and gas development represent semi-permeable barriers for migrating antelope. While antelope usually navigate these barriers, their migratory behaviors are often altered, similar to those of mule deer. While specific research is not available for antelope, mule deer unaffected by intensive energy development will spend up to 95% of the migration period in stopovers, slowing the speed of migration, and allowing them to take advantage of the best available

forage along their routes (Sawyer and Kauffman 2011). Increased levels of energy development in migration routes may also encourage detouring, consequently restricting the width of suitable migration habitat and potentially compromising the functionality of a corridor.

Research suggests that avoidance of oil and gas development by migrating antelope is variable, and can occur between 1-9.25% disturbance of the landscape, but there is no indication they habituate to this development (Lambert et al. 2022). Long-term avoidance of infrastructure reduces the size of important seasonal habitats, such as winter range or stopovers, and limits the number of animals which habitats can support. Population declines in mule deer associated with energy infrastructure avoidance on winter range can be long-term, if not permanent (Sawyer et al. 2017). Habitat use by migratory mule deer in the Sublette Herd steeply declined when surface disturbance from energy development exceeded 3% of the migration route (Sawyer et al. 2019). Understanding development thresholds is an important component of evaluating impacts of potential development and formulating appropriate mitigation strategies.

Renewable Energy

The Corridor's proximity to reliable sources of wind power and growing transmission capacity has led to interest in wind energy development near and within the Corridor. Utility-scale wind energy developments in Wyoming typically coincide with open landscapes composed of sagebrush-steppe or grassland habitats. These habitats are used by antelope as Crucial Winter Ranges and all other seasonal ranges. Within wind energy facilities, antelope avoid areas for stopover sites, move quicker near turbine arrays, and have reduced fidelity to migration routes when the facility is being constructed (Milligan et al. 2023). The long-term impacts of wind energy facilities on antelope population stability are not understood and much remains to be learned about the scope of indirect effects and the influence of utility-scale wind energy developments adjacent to migration corridors. There are currently no utility-scale wind energy facilities within the Corridor, however, there are several proposed facilities in various stages of planning and permitting within the Corridor.

Solar energy facilities have an expanding footprint into rangelands that provide important habitat for

many wild ungulate populations (Grodsky and Hernandez 2020). Proposals and development have rapidly increased in areas across Wyoming and given the scope of ground disturbance which solar energy projects require, direct loss of habitat could be substantial (Moore-O'Leary et al. 2017). Impermeable security fencing blocks access to and reduces connectivity between formerly available habitats, causing a barrier effect for antelope (Sawyer 2022). Additional infrastructure required to operate and maintain these facilities, such as roads, could further fragment important antelope habitats by causing direct and indirect habitat loss. The Sweetwater Solar Project, currently the only solar energy facility in the Corridor, was constructed in 2018 on BLM land. Placement and layout design of this project resulted in significant WVCs due to altered movement pathways after construction of the boundary fence, direct habitat loss, and reduction in summer home range size (Sawyer 2022) for GPS-collared antelope. Post-hoc efforts to mitigate the impacts of this solar energy facility to antelope continue with little to no progress occurring.

Transmission Lines and Utility Corridors

Transmission lines carry electrical power within Wyoming and to other states, and are likely to increase in number and capacity as the renewable energy industry expands in Wyoming. Transmission lines and the associated infrastructure may affect antelope through habitat degradation, displacement due to human disturbance, and habitat loss from service roads and structures. The Rocky Mountain Power Gateway West Project is ongoing and falls within the Corridor. In addition, the proximity of transmission lines could make the utility corridor more attractive for other renewable energy development projects, such as solar. The Corridor overlaps portions of 45 BLM-designated utility corridors that are use-specific, with allowable uses including power lines, pipelines, and fiber optic lines. Utility corridors focus the development of an allowable use to predetermined areas often defined in each BLM Field Office's RMP and also consolidate right-of-ways for aforementioned linear developments which minimizes the overall footprint of disturbance.

Mining

Sand, gravel, and rock materials are essential for construction industries, snow and ice management, and road stabilization and maintenance. As of October 2024, there are 17 open-pit gravel and rock mines (quarries) in the Corridor that vary in size from less than15 acres to more than 4,000 acres. With a steady demand and limited potential sites with suitable minerals, private, federal, and OSLI lands in the Corridor could be evaluated for feasibility of open pit-mining. Potential impacts to antelope include direct and indirect habitat loss and displacement. Mine components such as a gravel pit, waste rock dumps, tailings, impoundments, and haul roads could compromise Corridor connectivity. Similar to other forms of energy development, increased vehicle traffic, equipment operation, and noise related to mining activities could lead to avoidance. With designation, the WGFD will review OSLI solid mineral leases for parcels that are wholly or partially within a designated migration corridor. WGFD will also review mines for Migration Corridor EO compliance permitted through the WY DEQ. In addition to state agency review and permitting of mines, mines which involve BLM lands or minerals will undergo a review and permitting process through that agency. Management actions provided by the Migration Corridor EO do not apply to projects located on private lands.

Trona

The southwest portion of the Corridor overlaps the Known Sodium Leasing Area (KSLA), an area with substantial trona deposits. There are currently four permitted mines within the Corridor. These mines occur underground, but trona mines do have above-ground surface disturbance including

processing facilities, pipelines, evaporation ponds, roads, and rail lines — all of which have the potential to have direct and indirect impacts on migrating antelope. There are two additional proposed trona mines in the KSLA. One mine has proposed a processing facility, evaporation pond, and supporting infrastructure at the southern terminus of the Corridor.

Recreation (motorized and non-motorized)

Outdoor recreation has become increasingly popular in wildlands. Hiking, mountain biking, horseback riding, and off-road vehicle (ORV) use are common outdoor recreation activities. Of these, hiking, mountain biking, and ORV use are rapidly increasing in popularity. In particular, ORV use is projected to see a 30-60% increase in ridership by 2060 (Bowker et al. 2012). Within the Herd, hiking, mountain biking, camping, shed antler hunting and ORV use are common recreational activities during spring and summer. During fall and winter months, hunting, snowmobiling, cross-country skiing and snowshoeing become the dominant recreation. As outdoor recreation grows in popularity, the frequency of human-wildlife interactions will likely increase. While non-motorized forms of recreation are often perceived to have less impact on wildlife (Taylor and Knight 2003), research has shown that motorized and non-motorized activities can have negative impacts (Taylor and Knight 2003, Courtemanch 2014, Larson et al. 2016, Wisdom et al. 2018).

Short-term, immediate behavioral and physiological responses to recreation activities have been documented in many wildlife species (Knight and Cole 1991, Taylor and Knight 2003, George and Crooks 2006, Naylor et al. 2009, Westekemper et al. 2018). In ungulates, disturbances often result in increased vigilance, reduced foraging times, and temporal or spatial displacement from preferred areas (Yarmoloy et al. 1988, Cassirer et al. 1992, Westekemper et al. 2018, Wisdom et al. 2018). For example, Wisdom et al. (2018) found elk avoided trails and maintained large distances from recreators by moving to areas farthest from trails. As a result of these behavioral responses, ungulates may experience increased energy expenditure, increased stress, and reduced fecundity (Phillips and Alldredge 2000, Neumann et al. 2010). Long-term effects of outdoor recreation may result in avoidance of preferred habitats and altered movement patterns (Hamr 1988, Courtemanch 2014), however, these effects are difficult to quantify over large spatial scales.

Cheagrass and Associated Risk of Wildfire

Cheatgrass is an invasive, non-native, winter annual grass germinating from seed in late summer/early fall with some germination occurring in the early spring. After fall emergence, cheatgrass will grow rapidly until colder temperatures slow aboveground growth of the seedlings. Winter frost does not kill cheatgrass seedlings or cause them to become dormant; rather their root systems continue to develop throughout the winter. In early spring, cheatgrass seedlings are ready to take full advantage of available water and nutrients while native perennial grasses are still dormant. These seedlings resume growth in the spring, produce copious amounts of seed, and die in late July/early August. Hence, cheatgrass can "cheat" in the spring, outcompeting native perennial grasses and spreading quickly, especially in disturbed areas (Mealor et al. 2013).

Cheatgrass invasion of native plant communities impacts the quality and quantity of desirable and nutritious native forage species, thereby degrading habitats. Quality habitat is further threatened as cheatgrass increases fire frequency and intensity, impacting root systems and seedbanks of native species and further promoting cheatgrass spread.

Cheatgrass has impacted much of the West, (DiTomaso 2000) and is recognized in the Wyoming State Wildlife Action Plan as an invasive species of special concern (Wyoming Game and Fish Department 2010, 2017). Cheatgrass is currently designated as a noxious weed in all five counties overlapping the Corridor, providing authority to regulate and manage cheatgrass with county resources.

Cheatgrass has established within important antelope habitats within the Herd and within crucial migratory and wintering areas. Additionally, the elevational extent of cheatgrass continues to expand into important antelope parturition areas and summer habitats due to increased temperatures and altered precipitation associated with climate change (Bradley et al. 2009) as well as anthropogenic disturbance (Nielson et al. 2011). Noseworthy (2015) created statewide cheatgrass distribution prediction models to look at the probability of cheatgrass establishment and to estimate the probability of cheatgrass impact across Wyoming. This presence/absence model suggests cheatgrass establishment is substantial with approximately 50% of Wyoming having a greater than 75% probability of establishment. Cheatgrass mitigation and establishment prevention is a priority for the health of the Herd and corresponding habitats (Wyoming Game and Fish Department 2021). WGFD and its partners have implemented thousands of acres of cheatgrass treatments that overlap with this Corridor over the last 13 years (see Figure 10).

Other noxious weeds are problematic in localized areas throughout the Corridor, including spotted knapweed, hoary alyssum, leafy spurge, Dyer's woad and various thistle species. Local weed and pest districts are important partners in the management and control of invasive species.

Feral Horses

Feral horses (Equus caballus) are non-native grazers in North America, including throughout the southern extent of this Corridor. Areas utilized by feral horses have lower sagebrush density and plant diversity. The ecological function of semi-arid rangelands is negatively affected by increasing the risk of soil erosion and potentially decreasing availability of water for plant growth (Davies et al. 2014). Competition with feral horses for forage and water is a threat for the Herd and may negatively affect distribution across the landscape, pushing antelope into less productive habitat. Currently, the BLM is responsible for managing feral horses within horse management areas and controls population numbers periodically through round-up and removal activities (see Figure 11). The WGFD does not have management authority over feral horses. However, WGFD encourages the BLM to maintain horse populations at levels that support the habitat needs of wildlife.

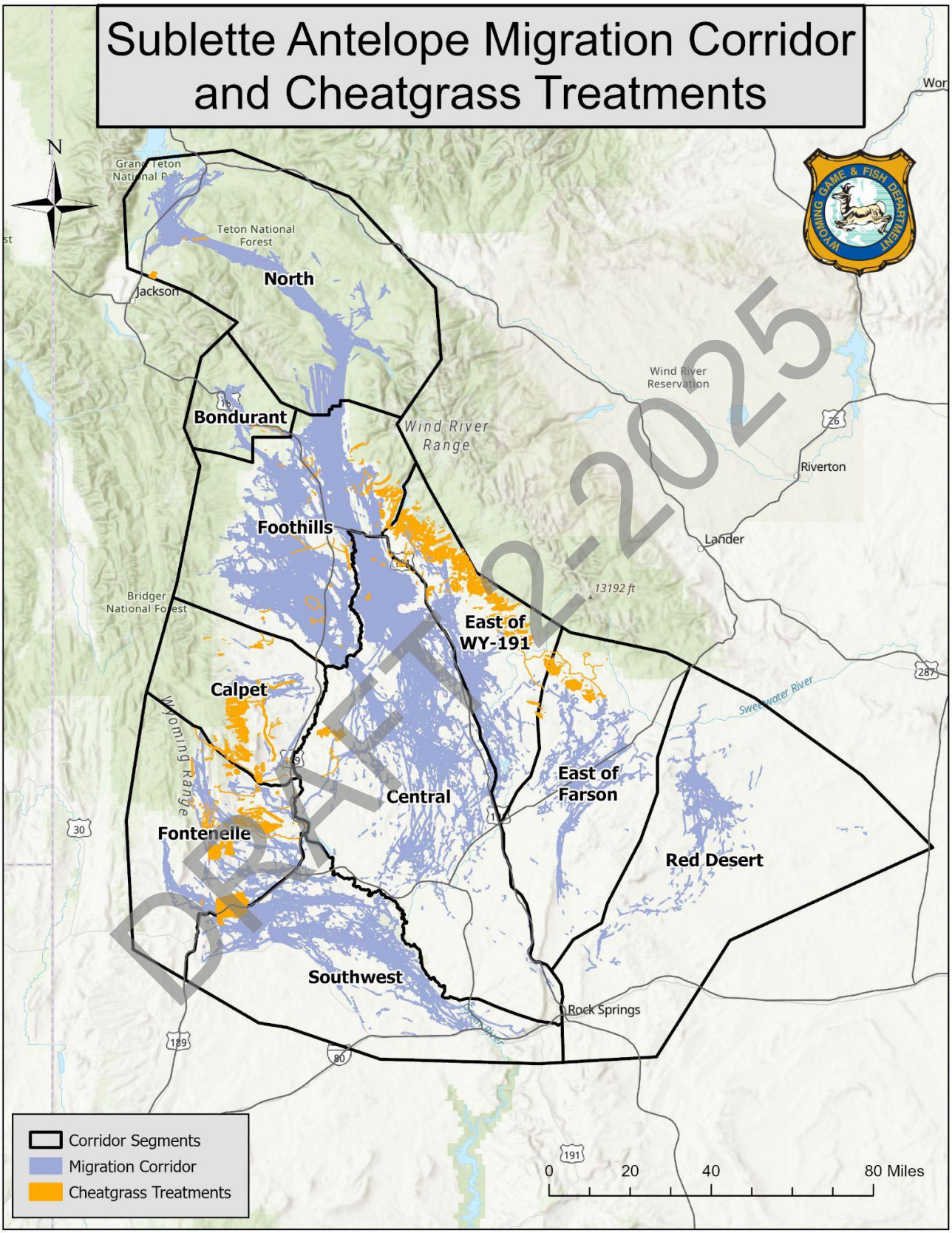

Figure 10. Cheatgrass treatments completed.

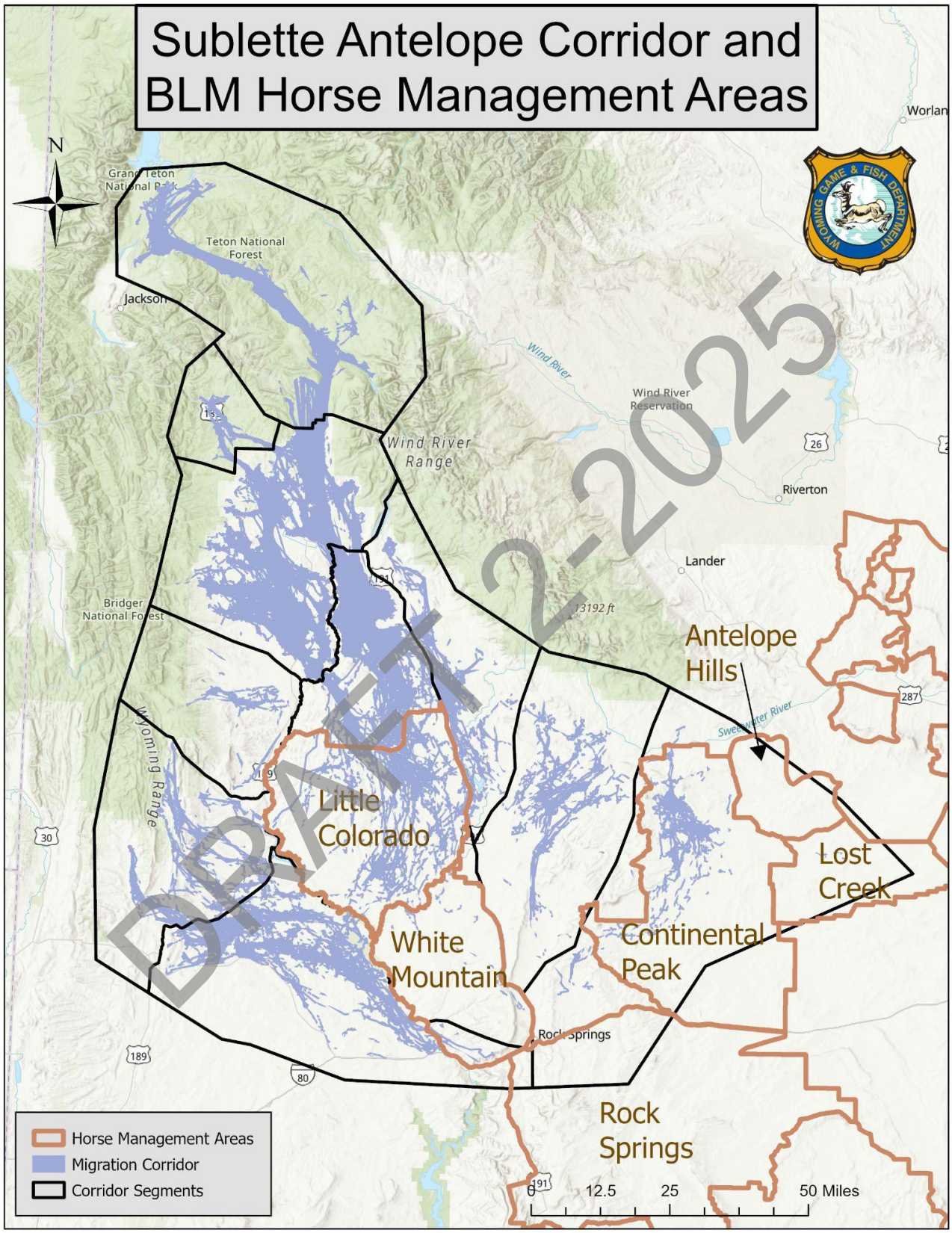

Figure 11. BLM Horse Management Areas.

MIGRATION ASSESSMENT

NORTH SEGMENT

General Description and Habitat Characteristics

The southern extent of the North Segment is at the BTNF boundary in the upper Green River area of the Corridor. From south to north during spring migrations, antelope follow the Bacon Creek drainage into the Gros Ventre River drainage before moving into the Antelope Flats area of GTNP. The majority of antelope in the North Segment spend the summer in GTNP around Antelope Flats, Kelly Hayfields, Timbered Island, Potholes, and Elk Ranch. Smaller groups summer on the National Elk Refuge, managed by USFWS. Some antelope remain in the Gros Ventre River drainage for the summer and a few small groups access high elevation grasslands in the Waterdog Lakes, Twin Creeks and Tosi Creek basins where antelope have been observed at more than 10,000 feet in elevation. The majority of this segment is located on public lands, primarily BTNF and GTNP. While the segment is dominated by federal land ownership, there are some intermixed private and OSLI lands. Dominant habitats include sagebrush, grasslands, riparian vegetation, aspen stands, and mixed conifer forest. Where open habitats and terrain are limited, individual antelope movement paths are constricted and narrowly aligned, creating bottlenecks. Elevation ranges from approximately 6,200 feet in the Jackson Hole valley floor to more than 9,000 feet as they cross between the Green River and Gros Ventre River watersheds. See Table 5 for a breakdown of landownership within this segment.

The North Segment is 100% migratory, with all antelope vacating the Jackson Hole valley and Gros Ventre drainage for the winter due to deep snow. In some years, small groups of antelope attempt to stay in Jackson, but if the winter is severe they suffer very high mortality. This migratory segment is unique because antelope have to pass over a high-elevation hydrologic divide to migrate to winter range. Therefore, the timing of fall migration out of Jackson is critical so antelope do not become trapped by deep snow. This segment is relatively small, estimated to be 500-700 animals before the severe winter and disease outbreak in 2022-23. Approximately 90% of this segment did not survive that winter period.

Table 5. North Segment land ownership.

Land Ownership	High Use Acres	Med Use Acres	Low Use Acres	Stopover Acres	Bottlenecks
BLM	0	0	0	0	0
USFS	38,554	63,533	124,572	15,179	3,040
OSLI	486	883	1,312	723	0
Private	1,329	1,828	2,849	558	99
WGFC	0	0	0	0	0
Other	6,548	15,122	39,679	8,783	0
Totals	46,916	81,366	168,413	25,243	3,139

Red Hills Bottleneck

The Red Hills Bottleneck is located entirely on BTNF land. This area has been well documented with camera traps to be restricted down to the width of a 2-foot wide trail in some places where antelope cross challenging topography. All antelope summering in Jackson Hole pass through this bottleneck (see Figure 12 and Appendix B). Recreation impacts, habitat fragmentation and cheatgrass invasion are the primary threats to this bottleneck. Ensuring no new surface disturbance, minimizing new fences, roads and trails, restricting seasonal recreation as well as invasive plant inventory and management via herbicide application are mitigation measures that would help conserve this bottleneck.

Bacon Creek Bottleneck

The Bacon Creek Bottleneck is located entirely on BTNF land. It is restricted by forested vegetation, which forces antelope to use a narrow riparian area along Bacon Creek. All antelope summering in Jackson Hole or the Gros Ventre River drainage pass through this bottleneck. Habitat fragmentation, conifer encroachment, invasion of cheatgrass and other weeds, and recreation impacts are the primary threats to this bottleneck. Ensuring no new surface disturbance such as mining operations and road and trail development, as well as minimizing new fences, reducing conifer encroachment via vegetation management and herbicide application, and restricting seasonal recreation are mitigation measures that would help conserve this bottleneck. The Pack Trail Wildfire perimeter burned more than half of this bottleneck in 2024, which should help open the forested vegetation (e.g., mitigate conifer encroachment) and therefore benefit antelope. Post-fire invasive plant surveillance and management will be critical components to maintaining bottleneck functionality.

Twin Creeks Bottleneck

The Twin Creeks Bottleneck is almost entirely on BTNF land. Because it is mostly non-forested, this is the only pathway for a portion of the Herd to access high-quality sagebrush, grassland and alpine summer habitats in the Twin Creeks and Tosi Creek basins. Habitat fragmentation and conifer encroachment are the primary threats to this bottleneck. Ensuring no new surface disturbance, minimizing new fences, roads and trails as well as reducing conifer encroachment with vegetation management are mitigation measures that would help conserve this bottleneck.

Land Uses

Motorized and non-motorized recreation represent major land uses within this region. Expansive population growth in adjacent communities and visitation to public lands have surged in recent years. The rising demand for recreational activities, driven by an expanding local population and increased tourism, will present a continued challenge in managing land use in this area. An increase in housing prices has added pressure to federal land managers to increase employee housing, which has the potential to increase infrastructure development as a newer land use. The Jackson and Blackrock Ranger Districts of the BTNF have travel management plans that benefit antelope migration by utilizing measures such as keeping the upper Gros Ventre River road above Slate Creek closed until June 1 and seasonally closing several motorized trails in the Gros Ventre River drainage. Land uses on the BTNF are managed in accordance with the 2008 BTNF Pronghorn Migration Corridor Forest Plan Amendment (United States Department of Agriculture, Forest Service 2008). This Amendment carried the standard that "all projects, activities, and infrastructure authorized in the Corridor will be designed, timed, and/or located to allow continued successful migration of the antelope that

summer in Jackson Hole and winter in the Green River Basin." The BTNF Pronghorn Migration Corridor overlaps the majority of the High-Use areas of the North Segment within the BTNF. The entirety of the Red Hills bottleneck and the majority of the Bacon Creek bottleneck are within the BTNF Pronghorn Migration Corridor. The Amendment provides standards for BTNF management decisions that benefit antelope migration. Because the BTNF Pronghorn Migration Corridor does not entirely encompass all of the High Use areas and bottlenecks or addresses other impacts, such as invasive plant species, it does not mitigate all of the risks within this segment. The on-going BTNF Forest Plan Revision presents an opportunity to align management areas and objectives between the WGFD's Sublette Antelope Migration Corridor management and the BTNF's land management standards for antelope migration.

Seasonal livestock grazing occurs in portions of this segment on public land allotments and private lands. Most private lands are relatively large, agricultural properties, although there are some smaller residential parcels as well. Teton County has zoning and land development regulations which provide some protections to important wildlife habitat, especially in regulating the density and locations of development on private lands, as well as requiring conditional use permits for certain activities. Teton County also has a wildlife-friendly fencing regulation for non-agricultural, private lands. However, the zoning regulations are only applicable to private lands within Teton County and therefore have limited impact on the footprint of the Corridor in this segment. A culture of fence conversion and removal, however, has resulted in considerable effort and progress in making fences more permeable to antelope on both private and public land in this segment. See Table 6 and Figure 13 for an overview of the crucial ranges and public land areas that overlap this segment.

Table 6. North Segment crucial range and public land areas overlap.

NORTH	Stopover Areas	High Use	Medium Use	Low Use
Big Game Crucial Range	12,419	31,681	47,028	71,988
National Refuges	0	0	3	53
National Park Service	9,535	6,468	15,137	40,005
WGFC	0	157	160	160
2008 BTNF Pronghorn Amendment	10,992	33,532	40,742	45,817
Sage Grouse Core Area	15,349	24,432	42,065	68,969
Wilderness Areas	798	1,018	1,561	3,044
BLM No Lease	0	1	3	5
Conservation Easements	154	278	278	421

Threats and Current or Anticipated Risks

Mortality on winter range: Recent disease outbreaks (M. bovis, 2023) and severe winter conditions (winter 2022-23) highlight the risk of future persistence of this segment. Given extreme mortality events on winter range, the northernmost summering portion of the Herd was reduced by 90% in the winter of 2022-23. There is evidence this Corridor has been lost before (Harper 1985), most likely due to historic overhunting. Antelope were mostly absent from the Jackson area during the early 1890s-1950, the same period of time when statewide populations were driven very low. As antelope numbers grew in the 1950s, they naturally re-established a migration into Jackson through the Gros Ventre drainage, though another migration route along the Hoback River was never re-established (Harper 1985). Given the tenuous nature of a singular path to access Summer Range, there is an elevated need to maintain permeable conditions for migration in this segment.

Motorized and non-motorized recreation: Demand for increased recreational opportunities are substantial in this segment. Recreational demand stems from an expanding local community and an increase in visitors. There is increasing demand for mountain biking (including electric mountain bikes), dirt biking, trail running/hiking, and ORV trails. Several companies in Jackson rent ORVs for unguided day-use by tourists, of which the Gros Ventre River drainage is a popular destination. One company offers scenic helicopter tours and there is potential for an expansion of air tourism activities in the future. Mining and energy development are not common in this segment (see Figure 14).

Habitat fragmentation: Conversion of private ranch land to residential subdivisions with higher density development is a future threat to this segment. In addition, some traditional agricultural producers in the Jackson area are seeking additional sources of revenue on their properties, including uses such as outdoor concerts, weddings, "glamping," and other large events and activities which may impact migrating antelope. Residential development or other infrastructure and activities may also occur on OSLI or federal lands, especially in GTNP where visitation is increasing with additional infrastructure to accommodate visitor numbers and employee housing currently being planned.

Cheatgrass and weed invasion: Noxious weeds are increasingly becoming a concern in the Jackson Hole valley and Gros Ventre River drainage. Previously, it was thought Teton County was at too high an elevation for cheatgrass, but cheatgrass has spread rapidly in recent years.

Habitat quality: Native and productive habitat that supports sagebrush communities are important for antelope. In some places sagebrush has been converted to non-native, grass-dominated habitat.

Conservation Opportunities to Mitigate Threats Native, Including Known Limitations

Recreation: The recently initiated BTNF Forest Plan Revision process presents an opportunity to re-visit, update, and support the Migration EO for this segment of the Corridor. Additionally, continuing to build strong relationships among federal and state agencies and NGOs will be critical to planning and managing future recreation on public lands that balances the public's desires while protecting migrating antelope. Strategic seasonal closures for certain types of recreation during migration may be an important tool for achieving this outcome.

Habitat fragmentation: Major volunteer efforts led by local NGOs, particularly the Jackson Hole Wildlife Foundation, have inventoried, removed and/or converted fencing to wildlife-friendlier designs in the Corridor and there are still additional opportunities to expand this work (see Figure 15). New fences should be located outside of high-use areas and stopovers when possible. Future residential and commercial development as well as new mining or other industrial development should be

located out of high use areas and stopover habitat to the extent possible. Habitat fragmentation from fences or other residential buildings are the primary threats to this segment. Reducing surface disturbances associated with new residential development, protecting private lands from development with CE's, minimizing new fences, removing and modifying existing fences, and installing fence crossing structures are mitigation measures that would help conserve this segment.

Cheatgrass and weed invasion: The Jackson Hole Weed Management Association has been established in an effort to manage and control weeds in a cross-jurisdictional cooperative effort. This effort will require increased capacity-building in future years to be successful. Multiple land management agencies and Teton County Weed and Pest District will need to continue to collaborate closely on comprehensive weed management. Mapping cheatgrass expansion followed by aggressive herbicide application is important to maintain healthy rangelands.

Habitat quality: The Upper Snake River Basin Sage-Grouse Local Working Group reviews applications and grants funding for projects that benefit sagebrush and sage-grouse. One of these projects, the Kelly Hayfields Restoration Project in GTNP, is converting smooth, brome-dominated historical hayfields into sagebrush habitat, which will benefit antelope.

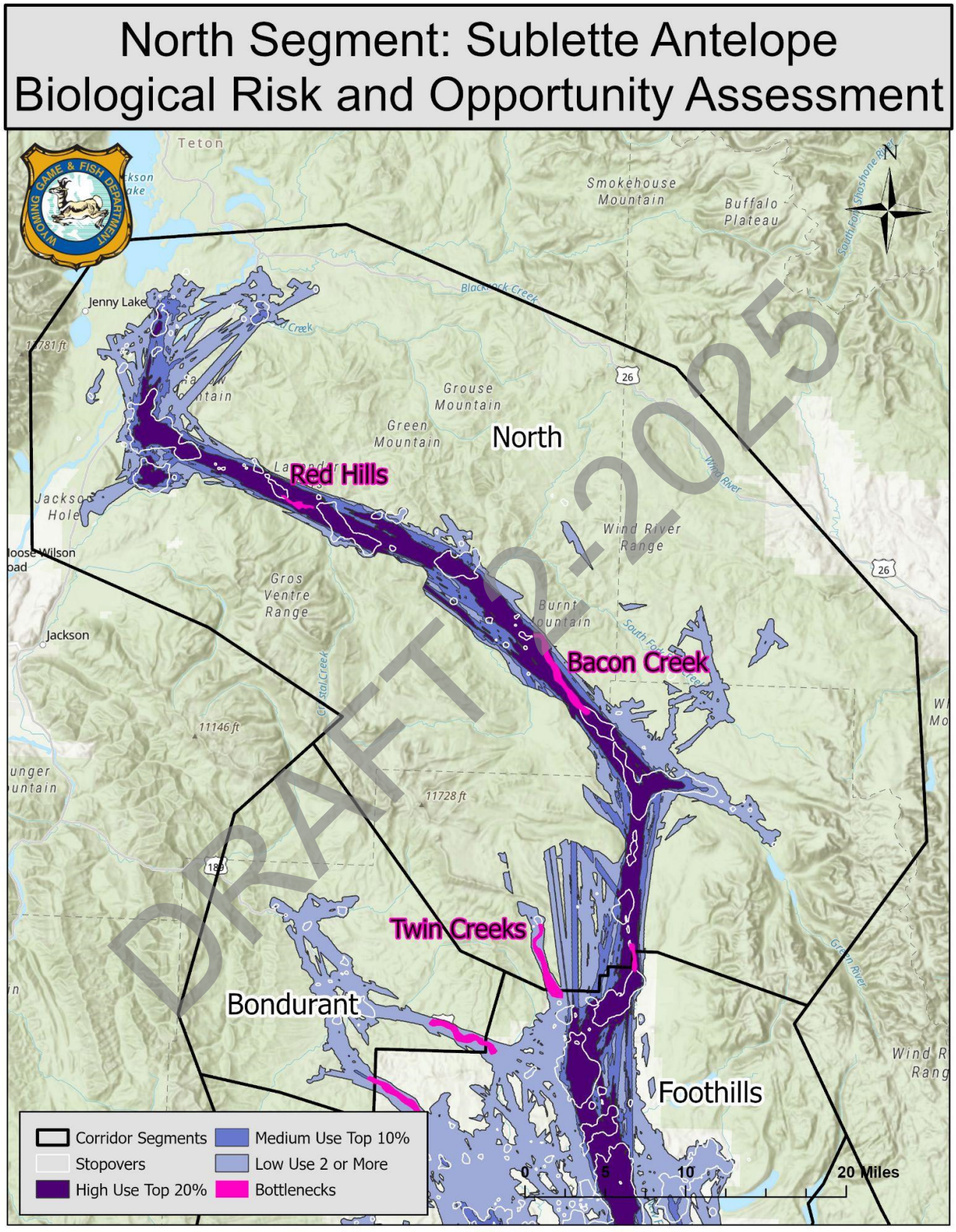

Figure 12. North Segment with use levels, stopovers and bottlenecks.

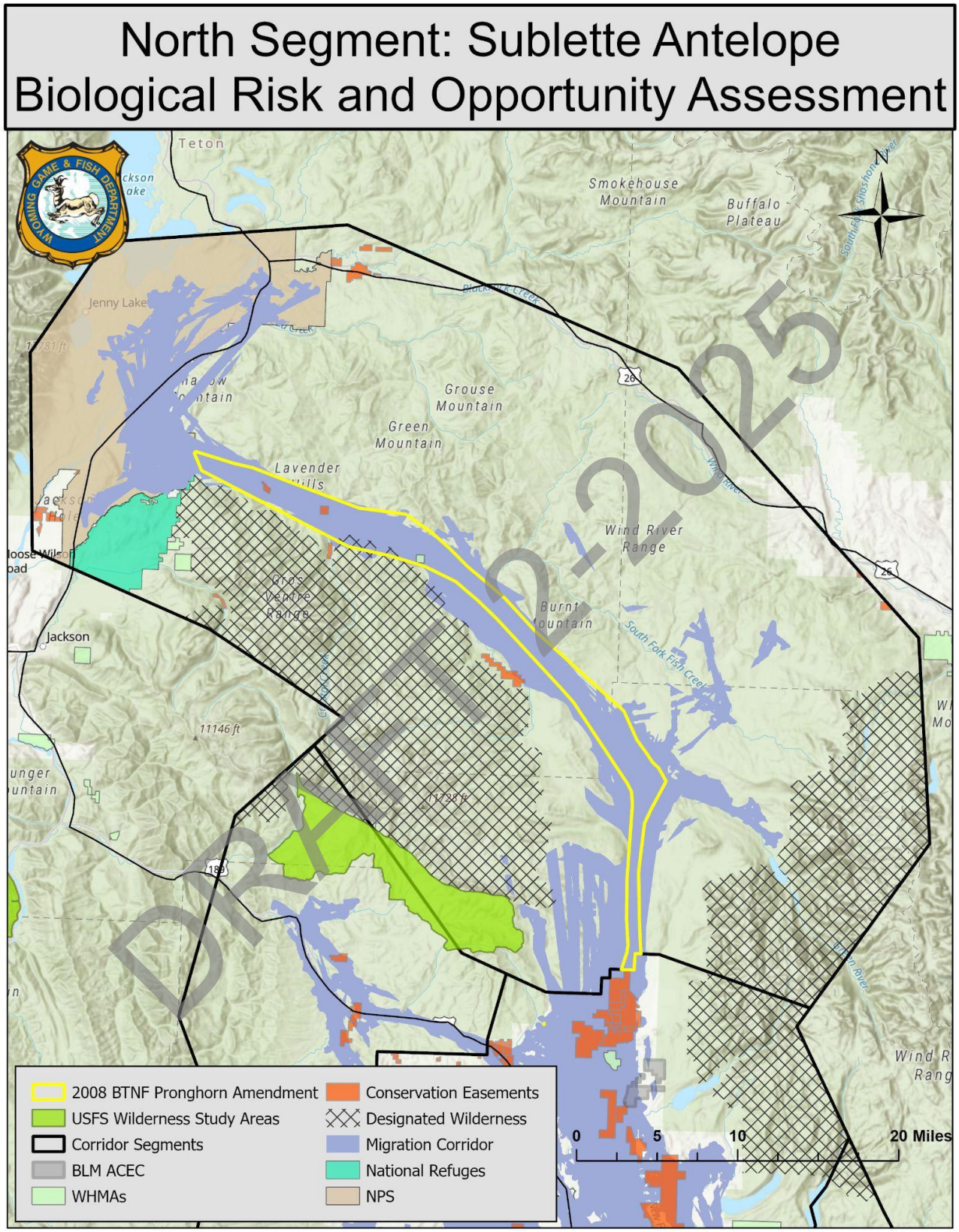

Figure 13. North Segment with CEs and federal protections.

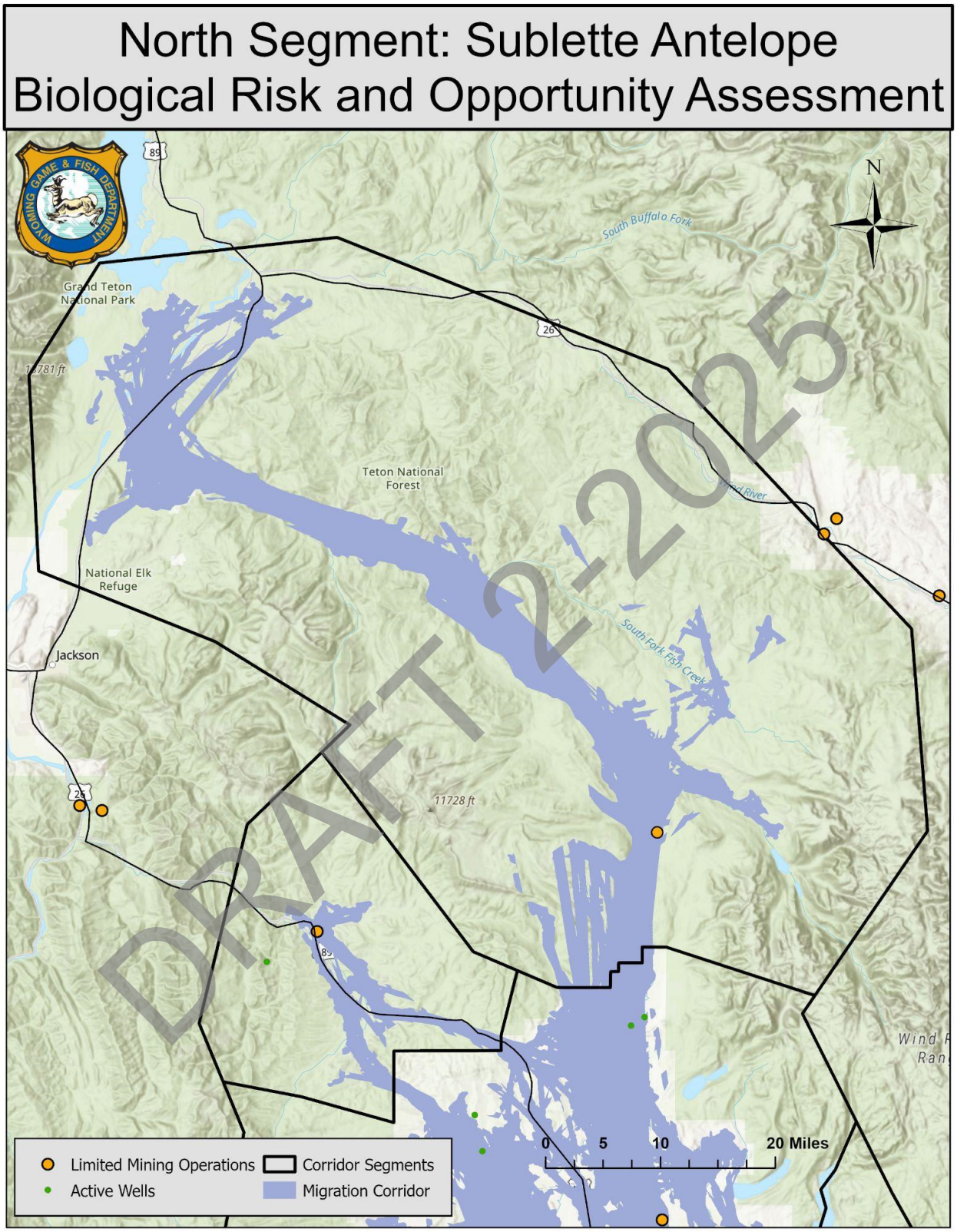

Figure 14. North Segment energy and mining development.

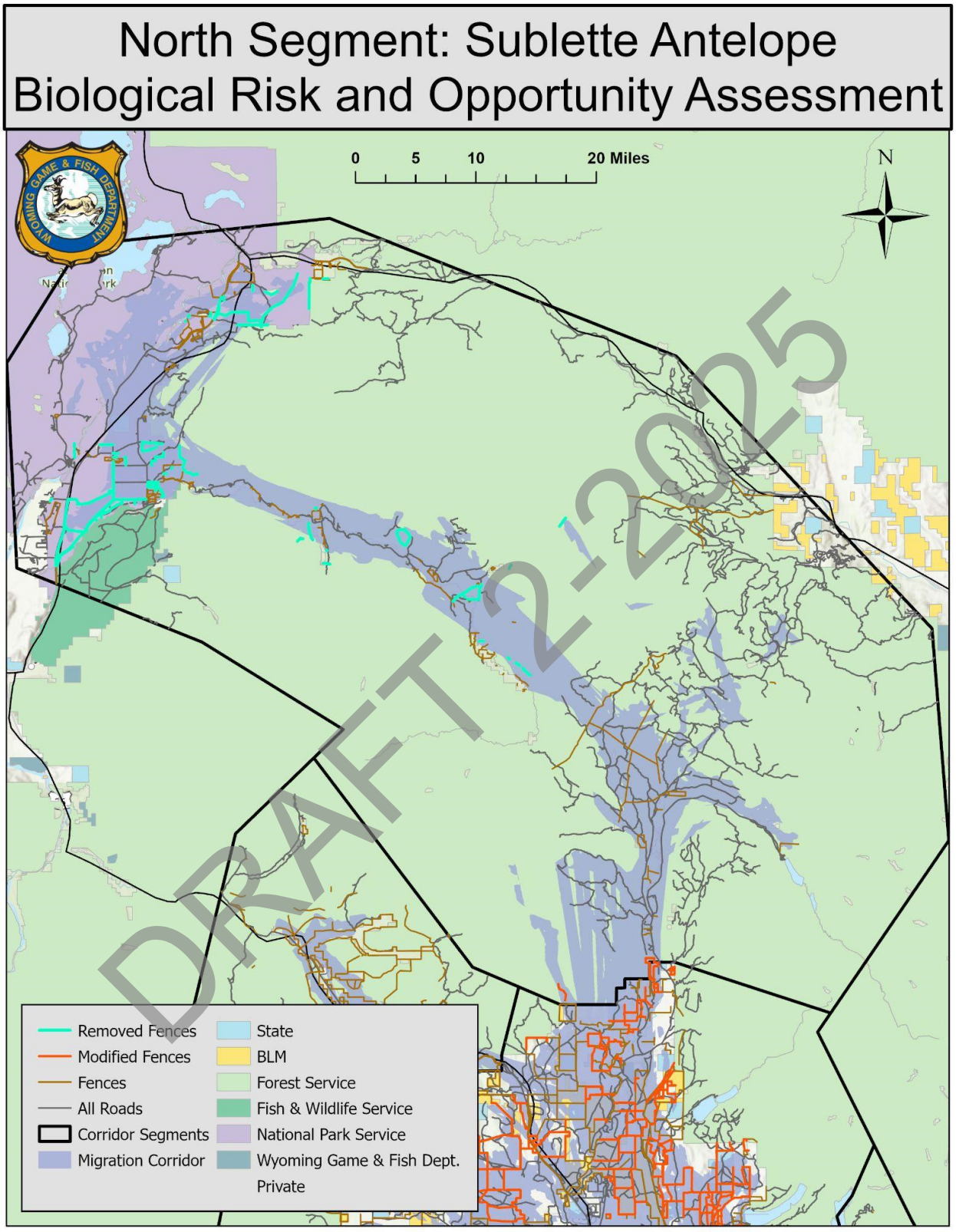

Figure 15. North Segment with roads and fences.

BONDURANT SEGMENT

General Description and Habitat Characteristics

Mixed conifer/aspen and sagebrush foothills of the Wyoming Range comprise the southwest portion of this segment, blending northward toward the foothills and peaks of the Gros Ventre Range. The highest elevations are dominated by rock and alpine habitats, leading down to mostly coniferous forests, followed lower by aspen forests, then rolling sagebrush foothills and grasslands near the major drainages in the bottoms of the valleys. The portion of the Herd utilizing spring-summer-fall ranges in the Bondurant basin experienced elevated mortality during the 2022-23 due to harsh winter conditions and an outbreak of M. bovis. As a result, hunting license allocations were greatly reduced in 2023 and eliminated in 2024 in Antelope Hunt Area 86. See Table 7 for a breakdown of landownership within this segment.

Table 7. Bondurant Segment land ownership.

Land Ownership	High Use Acres	Med Use Acres	Low Use Acres	Stopover Acres	Bottlenecks
BLM	0	0	0	0	0
USFS	0	118	17,573	889	1,206
OSLI	0	0	0	0	0
Private	0	0	5,156	520	0
WGFC	0	0	0	0	0
Other	0	0	4	0	0
Totals	0	118	22,733	1,409	1,206

Rim Bottleneck

The Rim Bottleneck is almost entirely on BTNF land. This part of the Corridor is greatly restricted by forested vegetation and U.S. Highway 189-191, and is one of only two pathways which antelope use to seasonally access the Bondurant Basin summer ranges during spring and then again in the fall to escape deep snow (see Figure 16 and Appendix B). Habitat fragmentation and conifer encroachment are the primary threats to this bottleneck. Ensuring no new surface disturbance, minimizing new fences, roads and trails, and reducing conifer encroachment with vegetation management are mitigation measures that would help conserve this bottleneck.

Noble Basin Bottleneck

See Foothills Segment narrative, below.

Land Uses

A majority of lands within the Bondurant Segment are managed by the BTNF with limited private agricultural and residential lands primarily occurring along the lower elevation riparian habitats comprising important spring-summer-fall habitat for the portion of the Herd that summer in this segment. Visitation to the BTNF has increased during recent years, and managing visitors and recreation on public lands will be an ongoing challenge. The 2008 BTNF Pronghorn Migration Corridor only protects that portion of the Corridor for a small portion of the Herd that summer in the Gros Ven-

tre River drainage and near Jackson.

Seasonal livestock grazing occurs throughout most of this segment on public land allotments and private lands. Most of the larger private lands in this segment are working ranch properties with traditional agriculture, although there has been a movement towards non-traditional agricultural and resort uses, along with an increase in smaller residential parcels as demand for housing continues to grow in Teton and Sublette counties. See Table 8 and Figure 17 for an overview of the crucial ranges and public land areas that overlap this segment.

Table 8. Bondurant Segment crucial range and public land areas overlap.

BONDURANT	Stopover Areas	Medium Use	Low Use
Big Game Crucial Range	1,325	118	18,822
Conservation Easements	139	0	827
BLM NSO	0	0	1

Threats and Current or Anticipated Risks

Habitat fragmentation: Increasing residential development pressure is likely the most considerable current and anticipated risk to antelope that seasonally reside in this segment. There has been a recent increase in rural residential development in the Bondurant area of Sublette County, with several new proposed and approved relatively small (i.e., approximately 100 acres) residential subdivisions. Impermeable fences exist in the Upper Hoback area which impede antelope movements, requiring individuals to navigate around these areas unless gates are opened to facilitate permeability. Mining and energy development are not common in this segment (see Figure 18).

Habitat quality: Conifer encroachment could happen due to natural succession in the Noble Basin and Rim bottlenecks which could complicate seasonal passage for antelope through these constrictions.

Conservation Opportunities to Mitigate Threats, Including Known Limitations

Habitat fragmentation: Continued efforts to conserve private lands through CEs represent great opportunities to mitigate threats to antelope migration in this segment, especially with increasing residential development pressures in northern Sublette County. CEs should be prioritized for funding within the Corridor. Extensive opportunities exist to implement voluntary conservation practices on private land such as CEs and habitat leasing through the Grassland CRP program. Funding opportunities are at an all-time high, particularly due to the USDA Migratory Big Game Initiative, but available funding still limits the number of projects that are implemented annually.

The BTNF has begun their Forest Plan revision process which may evaluate the land use decision framework on BTNF, including the areas around the Noble Basin and Rim bottlenecks that provide access to summer ranges. In 2009, the Wyoming Legacy Act was enacted by Congress and resulted in the withdrawal of 1.2 million acres of land managed by the BTNF from future oil and gas leasing in the Noble Basin area. In 2017, the BTNF retired the remaining 40,000 acres of active oil and gas leases that were located on BTNF lands in the Hoback Basin and south along the east slope of the Wyoming Range. Future potential for oil and gas leasing in this segment is low. Locating any new mining or other industrial development should occur outside high use and stopover habitat.

Minimal fencing is present in the bottlenecks within this segment (see Figure 19). The majority of existing fencing in the area has already been converted to wildlife-friendly standards. Placement of wildlife crossing structures in these fences would further aid in permeability. New fences throughout the segment should be located outside of high use areas and stopovers when possible.

Habitat quality: Reducing tree cover along known migration routes in and near the bottlenecks would improve habitat suitability for antelope. Proactive management should also be prioritized in stopover habitat and high use areas.

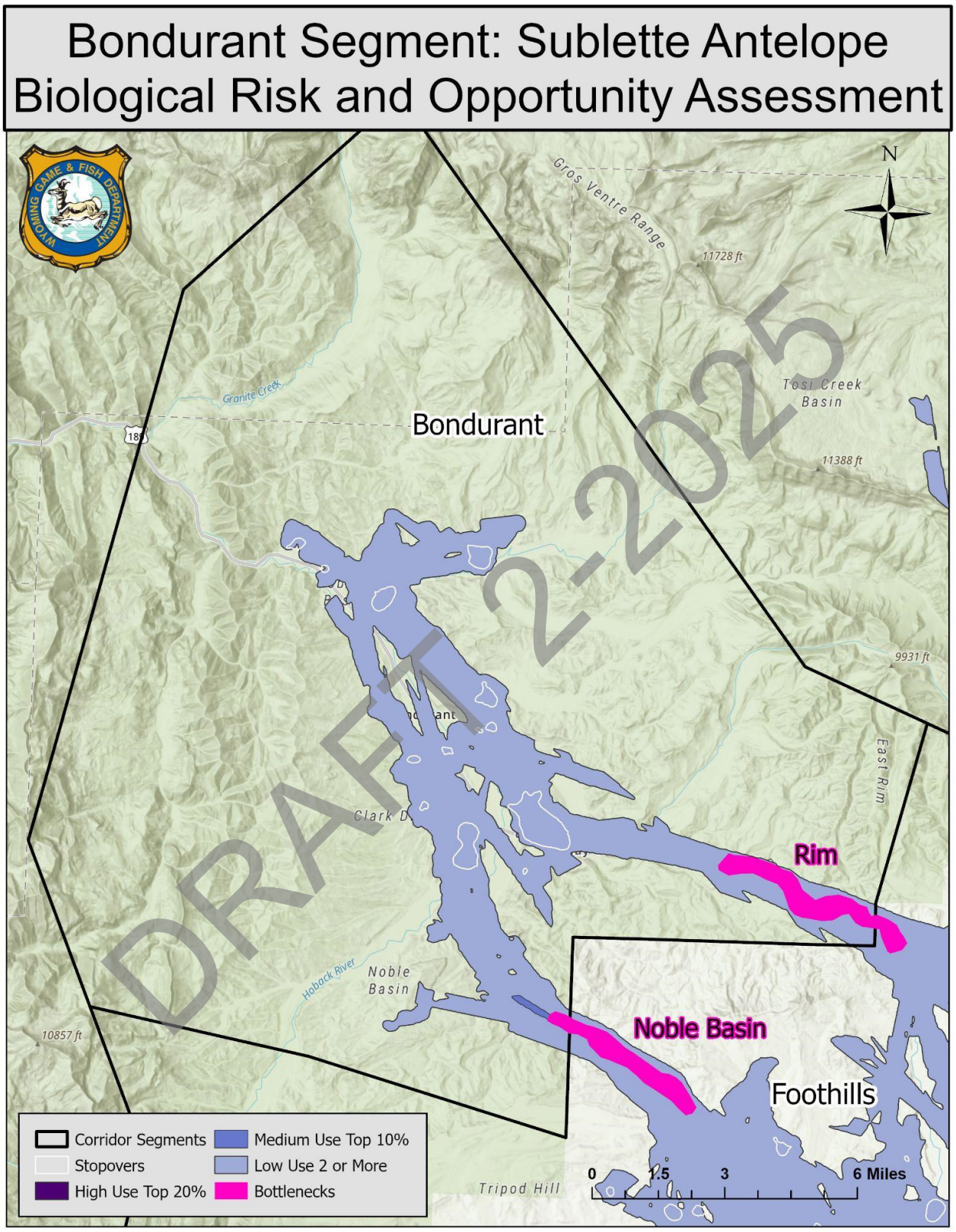

Figure 16. Bondurant Segment with use levels, stopovers and bottlenecks.

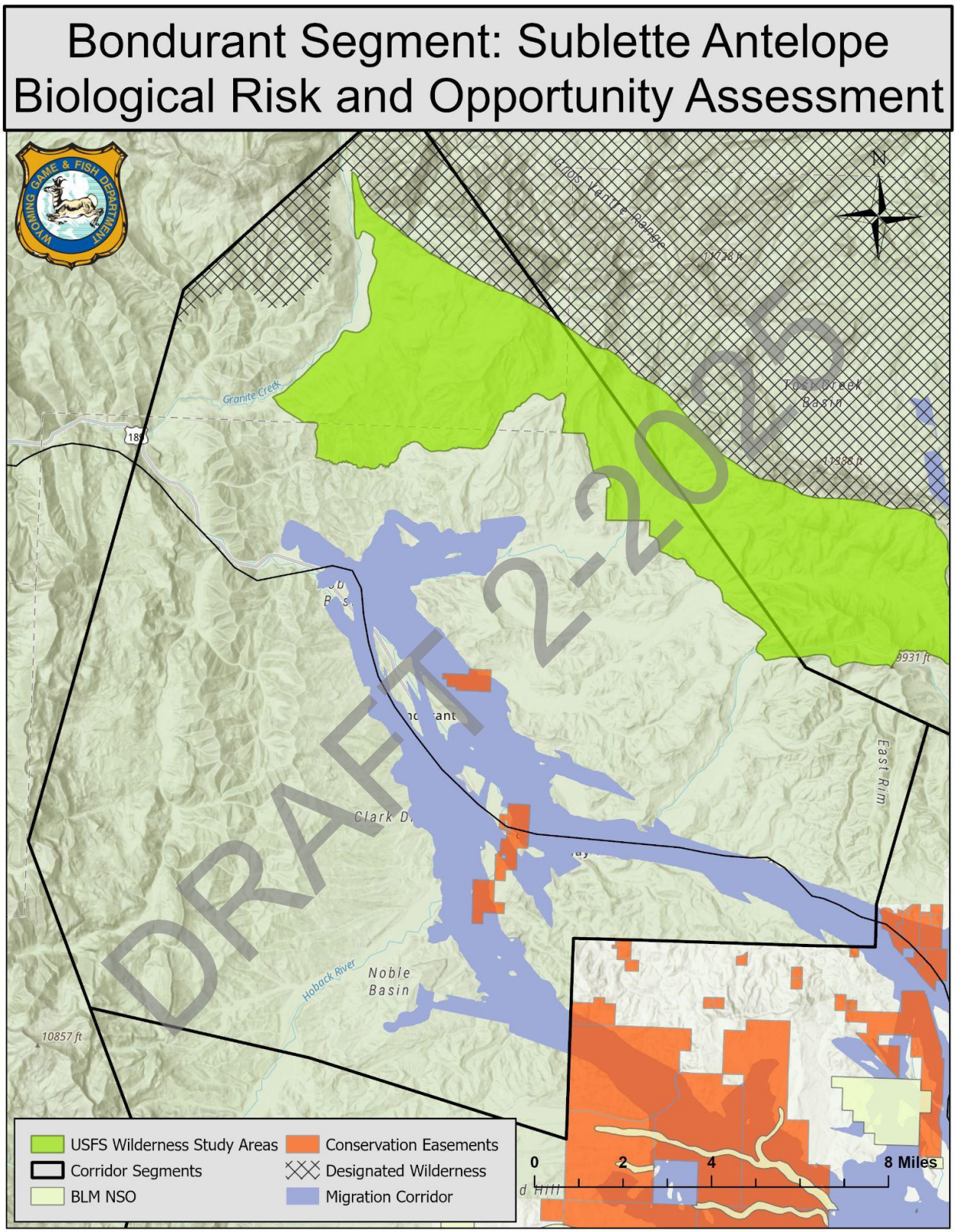

Figure 17. Bondurant Segment with CEs and federal protections.

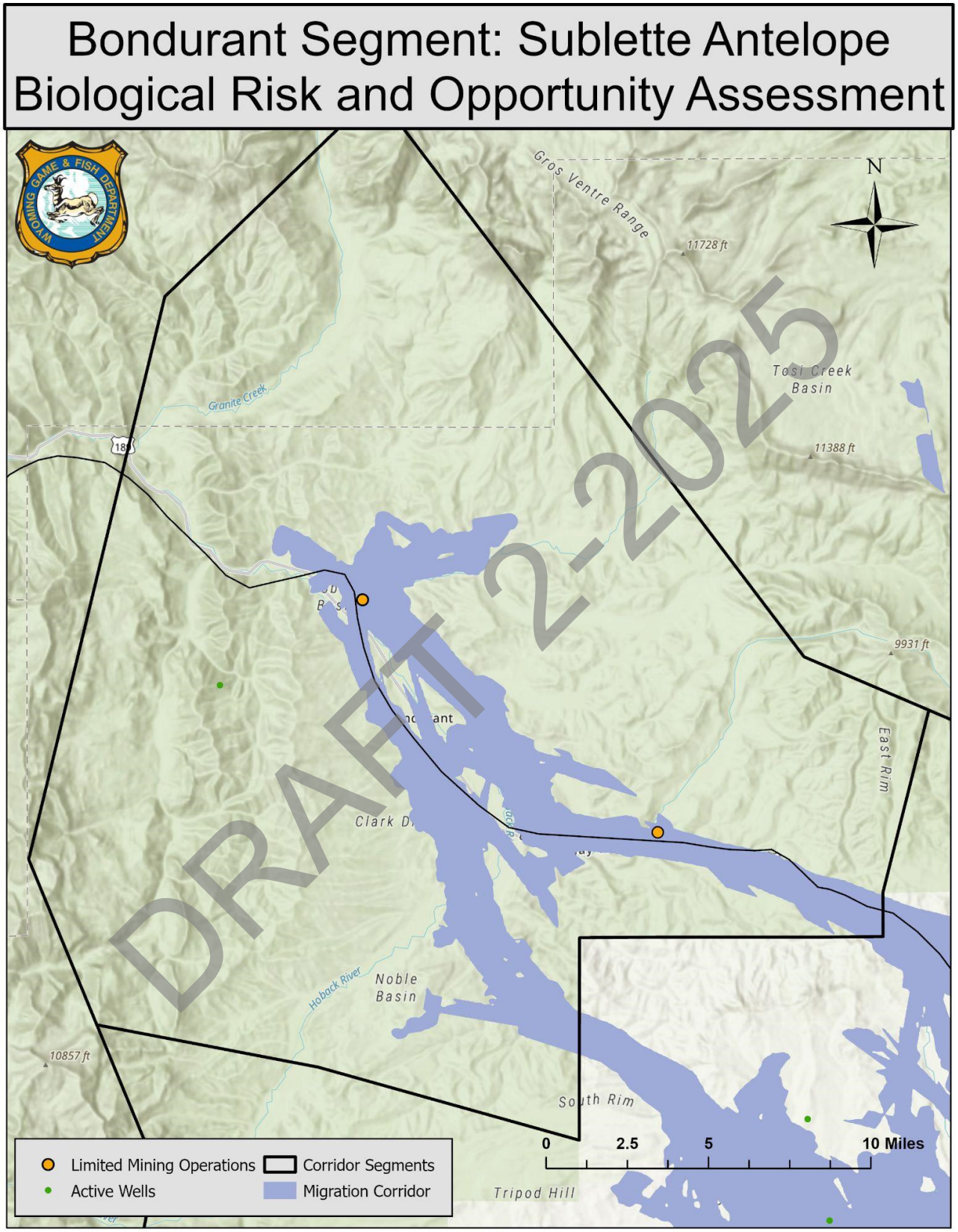

Figure 18. Bondurant Segment energy and mining development.

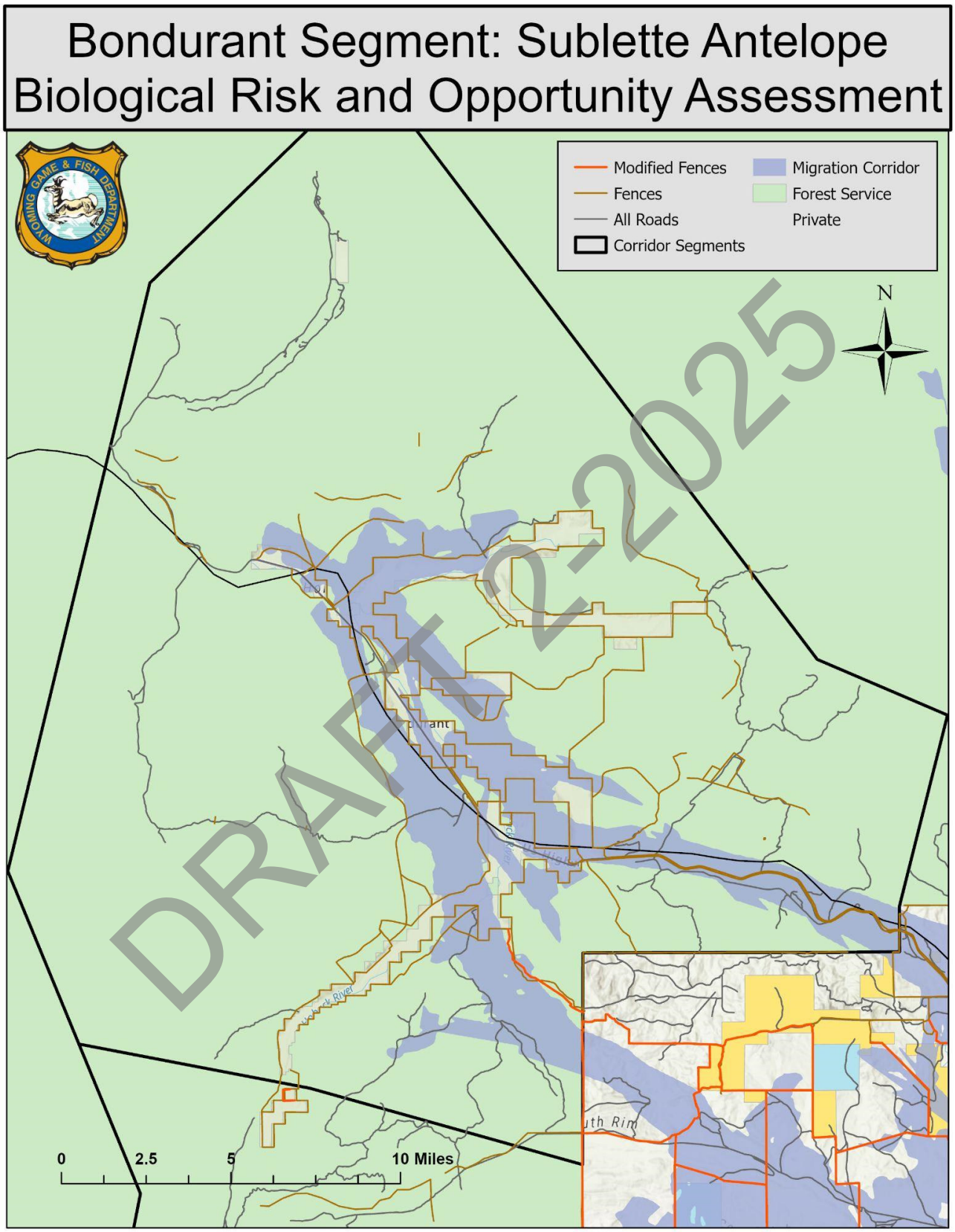

Figure 19. Bondurant Segment with roads and fences.

FOOTHILLS SEGMENT

General Description and Habitat Characteristics

The Foothills Segment is the northerly terminus of migration for some individuals in the Herd, serving as summer range, and is used during migration for those individuals that continue on to the Bondurant or North segments during spring. Habitats of the Foothills Segment are dominated by sagebrush in the lower elevations, aspen/conifer stands at higher elevations within the Wyoming and Wind River ranges, and riparian areas and irrigated meadows associated with the Green River, New Fork River, Horse Creek and Beaver Creek drainages. Habitat treatments over the last ten years have targeted older, closed-canopy sagebrush and decadent bitterbrush, rejuvenating aspen, and controlling invasive weeds such as cheatgrass and perennial pepperweed. See Table 9 for a breakdown of landownership within this segment.

Table 9. Foothills Segment land ownership.

Land Ownership	High Use Acres	Med Use Acres	Low Use Acres	Stopover Acres	Bottlenecks
BLM	20,605	62,290	170,831	59,997	1,276
USFS	5	9	917	71	4
OSLI	2,279	4,570	23,673	5,164	73
Private	18,165	32,834	190,358	33,703	1,640
WGFC	101	469	641	44	0
Other	234	390	1,243	105	13
Totals	41,389	100,562	387,663	99,084	3,006

Trappers and Daniel Overpass Bottlenecks

The Trappers and Daniel Overpass bottlenecks are on BLM land and were mapped due to the restriction around the two overpasses that were constructed in 2012-13 with the Trappers Point wildlife crossing project. These overpasses were constructed to facilitate wildlife crossings across Highway 191 to reduce wildlife-vehicle collisions, and are of particular importance to migrating antelope given their preference to use open spaces afforded by overpasses rather than using underpasses. However, these structures include an 8-foot-tall wildlife-proof fence along the highway to force migrating ungulates to use these overpass structures when migrating through this part of the corridor. The area surrounding these overpasses is vital for connectivity and to provide consistent access to the crossing structures. Nearly all antelope that move through this wildlife crossing project use one of these two overpasses (see Figure 20 and Appendix B).

Habitat fragmentation is the primary threat to this bottleneck. Ensuring no new surface disturbances are constructed adjacent to the overpass structures, and minimizing new fences, modifying existing fences, and adding fence crossing structures to the approach areas of the structures are mitigation measures that would help conserve this bottleneck. Some of this fence work is currently underway.

Kendall Bottleneck

The Kendall Bottleneck is located primarily on private land with some peripheral BTNF land in Kendall Valley near the BTNF boundary. This area has a very tight restriction between a dense resi-

dential subdivision that includes many fences and forested habitat to the west that is not preferred by migrating antelope. This bottleneck must be passed through in order for antelope to access the BTNF Upper Green, Jackson and Gros Ventre summer ranges. An education and fence modification project involving the WGFD and private property owners within the Redstone Subdivision, west of the Green River and south of Rock Creek, was conducted from 2004-06 in an effort to maintain antelope movements in this tightly constricted bottleneck. Additional fencing modifications to improve antelope connectivity, led by the Green River Valley Land Trust, were completed between 2010 and 2014. These projects resulted in many property fences being modified or removed, facilitating antelope passage, yet additional opportunities remain for fence modifications within this bottleneck.

Habitat fragmentation from fences or other residential buildings are the primary threats to the Kendall Bottleneck. Reducing surface disturbances associated with new residential development, protecting private lands from development with CE's, minimizing new fences, removing and modifying existing fences, and installing fence crossing structures are mitigation measures that would help conserve this bottleneck.

Big Piney Bottleneck

The Big Piney Bottleneck is located primarily on BLM land north and east of the town of Big Piney. The bottleneck is a constriction in a portion of the migration corridor that stretches between Wyoming Highway 351 and U.S. Highway 189. The north part of this corridor includes paired gates in four places located along U.S. Highway 189 north of the Sublette County fairgrounds. These gates are opened seasonally to improve permeability for antelope to cross the highway during migration. Other restrictions to movement are created by a residential subdivision to the north and a facility with chain-link fence to the south which both restrict movement options for antelope in this part of the corridor.

Habitat fragmentation from residential buildings and fences, and the risks of crossing U.S. Highway 189 are the primary threats to this bottleneck. Reducing surface disturbance associated with residential development, protecting private lands from development with CE's, minimizing new fences, removing and modifying existing fences, installing fence crossing structures, and ensuring no new mining or other commercial development are located within the bottleneck are mitigation measures that would help conserve this bottleneck. Additionally, current fence-crossing structures should continue to be opened seasonally to facilitate migrations.

Noble Basin Bottleneck

The Noble Basin Bottleneck is primarily on private land, which is all under CE. This is one of only two places antelope are known to access summer range in the Bondurant Basin. This portion is restricted by forested vegetation adjacent to the bottleneck, which limits suitable options for antelope movement. Conifer encroachment and habitat fragmentation from fences are the primary threats to this bottleneck. Reducing conifer encroachment with vegetation management, minimizing new fences and installing fence crossing structures are mitigation measures that would help conserve this bottleneck.

Land Uses

This segment has potential for significant future land use changes as 49% of the area is private land. In recent years, residential subdivision of private lands has been permitted within the corridor and additional subdivisions are currently proposed as the demand for housing in Sublette County continues to grow. Many CEs are in place in this segment and extensive fence modification projects have been completed over the last decade See Table 10 and Figure 21 for an overview of the crucial rangTh-

is segment has potential for significant future land use changes as 49% of the area is private land. In recent years, residential subdivision of private lands has been permitted within the Corridor and additional subdivisions are currently proposed as the demand for housing in Sublette County continues to grow. Many CEs are in place in this segment and extensive fence modification projects have been completed over the last decade. See Table 10 and Figure 21 for an overview of the crucial ranges and public land areas that overlap this segment. There are several gravel pits in operation seasonally in areas used by antelope (see Figure 22). Oil and gas development exists, but is currently dispersed and has minimal impact on the permeability and disturbance of this landscape. Renewable energy has not been prioritized in this segment by proponents based on current technologies and due to poor access to existing transmission lines. Motorized vehicle and non-motorized recreation in this segment is nominally present, but greatly increases during fall by big and small game hunters and in May by shed antler hunters. Motorized closures are in place on BLM land from Jan. 1-April 30 in the Bench Corral, Ryegrass and Mesa areas.

Table 10. Foothills Segment crucial range and public land areas overlap.

FOOTHILLS	Stopover Areas	High Use	Medium Use	Low Use
Big Game Crucial Range	69,665	28,206	76,292	279,202
BLM ACEC	5,430	2,680	4,831	7,912
Conservation Easements	8,239	6,456	10,432	65,271
WGFC	44	113	482	693
Path Of The Pronghorn	0	7	7	8
Sage Grouse Core Area	89,955	37,292	90,481	323,951
Wilderness Areas	14	0	0	0
BLM No Lease	64,911	30,334	69,403	181,166
BLM NSO	16,351	2,094	12,620	82,131

Threats and Current or Anticipated Risks

Residential development: The most significant threat to the functionality of this segment is rural residential development. With residential development, connectivity is not only compromised by the footprint of homes, but also by construction of new roads, fences and increased disturbance associated with noise, pets, and recreation adjacent to housing developments. Conversion from private working agricultural lands to other land uses has had a negative effect on corridor functionality in localized areas, and has potential to expand in the near future. Although this segment has the most CE acreage of all segments (65,271 acres), many residential subdivisions are already in place. These subdivisions appear to function as semi-permeable barriers having deflected antelope movements around them. Additional residential development expansion in the vicinity of Cora Butte and 40 Rod Flat areas will negatively impact antelope migration within this segment.

Habitat fragmentation: In 2012-13, an 8-foot-tall net wire ROW fence was constructed along a 12-mile stretch of U.S. Highway 191 associated with the Trappers Point wildlife crossing project. This fence was designed to funnel migrating antelope and mule deer through two overpasses and six underpasses. A post construction, 3-year average estimate of 2,700 antelope and 3,700 mule deer used these crossing structures during the spring and fall migration periods. Post-construction camera monitoring reported big game collisions have declined by nearly 90% (Sawyer et al. 2016). WVCs occurring along U.S. Highway 189, north of the Trappers Point wildlife crossing project and along WY Highway 352 between the Trappers Point project and Kendall Valley, are likely to increase based on statewide trends for WVC numbers. Several stretches of WYDOT ROW fences have been replaced with more permeable fence specifications in this segment, including north of the Trappers Point

wildlife crossing project on U.S. Highway 189-191 through Bondurant and from Cora to the BTNF boundary on Wyoming Highway 352.

Cheatgrass and weed invasion: Cheatgrass invasion is mapped and has been treated extensively in this segment, with very few acres of known cheatgrass invasion remaining untreated. Increased roads and development can also serve as a path for invasion from invasive annual grass species.

Habitat quality: Much of the sagebrush habitat in the Foothills segment has been treated over the last several decades, largely to diversify seral stages of sagebrush or to increase grass for livestock. While managers believe diversity of sagebrush is beneficial to sagebrush obligates like antelope, wildlife use of treated areas post-treatment have largely been mixed over the long-term. Vegetation enhancements that reduce sagebrush cover should be reviewed carefully, and overall sagebrush canopy cover should be evaluated prior to implementation in areas to be treated as well as in adjacent areas.

Conservation Opportunities to Mitigate Threats, Including Known Limitations

Residential development: The Sublette County Comprehensive Plan has a county policy specific to migration corridors which states, "...consider migration corridors, crucial winter ranges, and other important habitats when evaluating land use proposals. In some cases, the migration corridors that link summer and winter ranges are already tightly constricted. These areas are recognized as being very sensitive and their integrity should be protected. There are many tools available, beyond County zoning regulation, to shelter the function of important wildlife areas." Recognition of migration corridors in such a plan is evidence of the value local residents and their governments place on migratory ungulates. Extensive opportunities exist to implement voluntary conservation practices on private land such as CEs and habitat leasing through the Grassland CRP program. Funding opportunities are at an all-time high, particularly due to the USDA Migratory Big Game Initiative, but available funding still limits the number of projects that are implemented annually. CEs should be prioritized for funding within the Corridor.

Habitat fragmentation: Enrollment in programs to modify fences on private land has been increasing throughout this segment (see Figure 23). In addition to funding, fence modifications are limited by contractor availability and agency capacity to manage projects. Additional opportunities exist for improving fence permeability throughout this segment, such as installing fence crossing structures like paired gates on ROW fences along Wyoming Highway 354 - County Road 112 (Horse Creek Road) and U.S. Highway 189 near Bench Corral and the Hoback Rim. New fences should be located outside of high use areas and stopovers when possible. Locations of additional disturbances such as new mining or other commercial development should be placed out of high use and stopover areas.

Cheatgrass and weed invasion: Cheatgrass and invasive species control is ongoing across all land ownerships and should continue to be prioritized for funding and implementation by partners.

Habitat quality: Opportunities to manage BLM land through shrub and wet meadow enhancements and erosion control structures exist, but are limited by BLM capacity to complete National Environmental Policy Act (NEPA) analyses, and to a lesser extent, project funding. There is a current sagebrush enhancement project north of Cora on BLM land in the 40 Rod Common area. Approximately 645 acres were treated in 2024 with an additional 1,200 acres approved for future treatments.

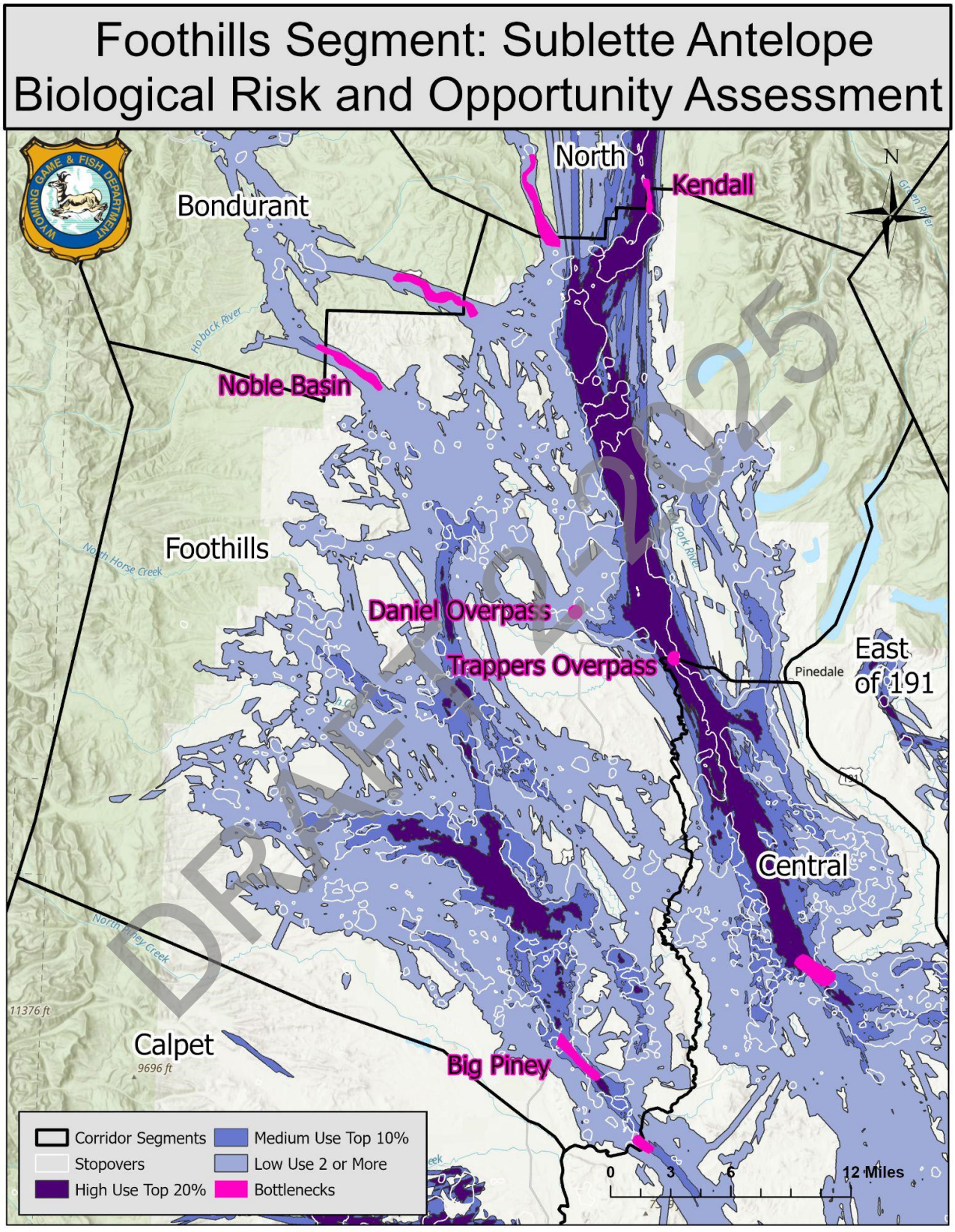

Figure 20. Foothills Segment with use levels, stopovers and bottlenecks.

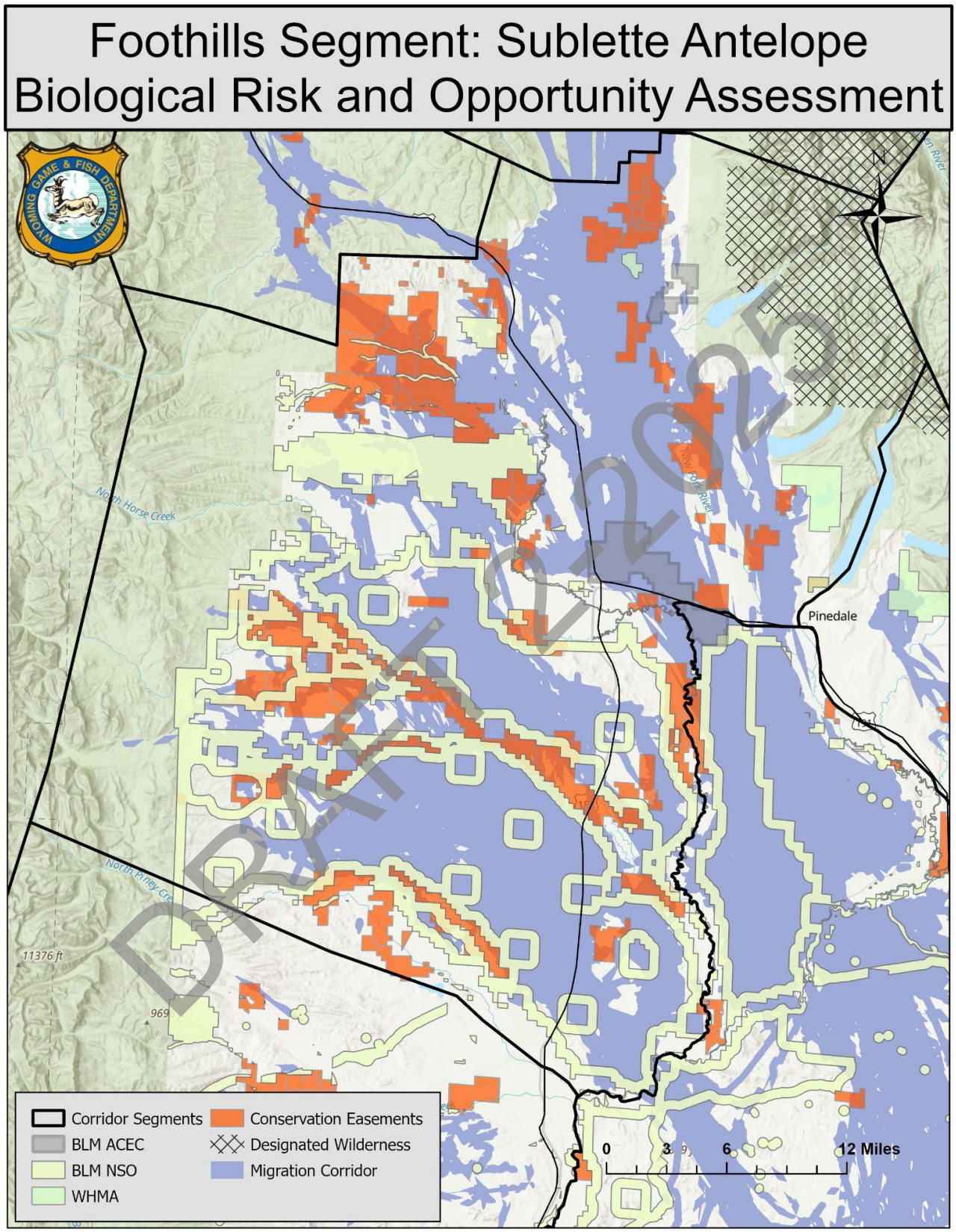

Figure 21. Foothills Segment with CEs and other federal protections.

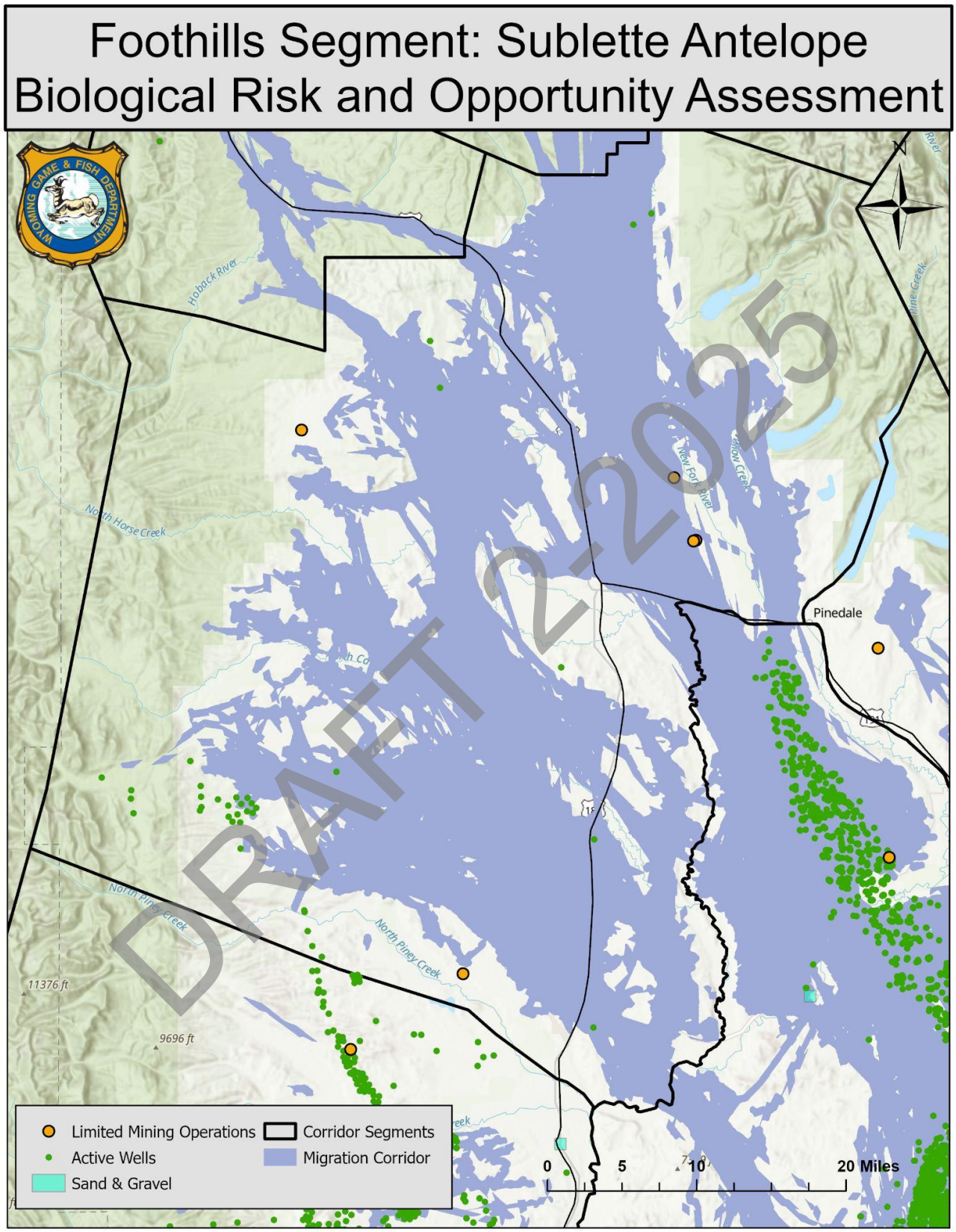

Figure 22. Foothills Segment energy and mining development.

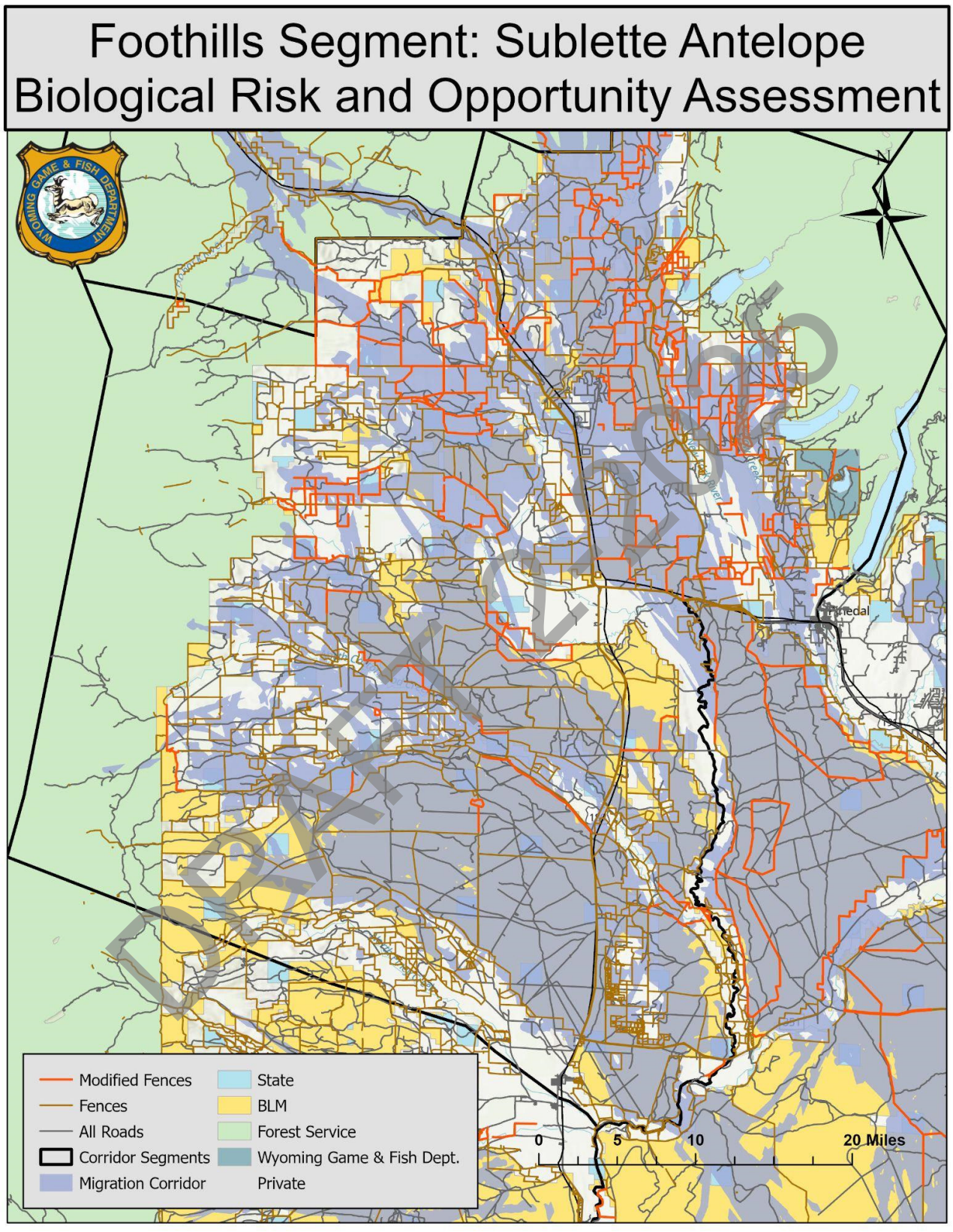

Figure 23. Foothills Segment with roads and fences.

EAST OF 191 SEGMENT

General Description and Habitat Characteristics

This segment is dominated by rolling sagebrush foothills at higher elevations, Wyoming big sagebrush at lower elevations, and grasslands near major drainages in valley bottoms where antelope spend time during spring, summer, and fall. Several creeks drain into the New Fork and Big Sandy rivers. Crucial Winter Range is located in the southern portions near Big Sandy Reservoir and the town of Farson. GPS collar data most likely underrepresents habitat used for migration due to limited data that has been collected, particularly in the north and east areas of this segment. See Table 11 for a breakdown of landownership within this segment.

Table 11. East of 191 Segment land ownership.

Land Ownership	High Use Acres	Med Use Acres	Low Use Acres	Stopover Acres	Bottlenecks
BLM	13,371	48,774	86,289	24,132	0
USFS	0	0	0	0	0
OSLI	725	3,691	6,696	1,643	0
Private	443	3,670	8,917	2,767	0
WGFC	21	575	1,268	407	0
Other	226	1,040	3,213	781	0
Totals	14,785	57,750	106,383	29,730	0

Land Uses

A majority of lands within this segment are managed for multiple-use by the Pinedale and Rock Springs BLM field offices. Relatively large, traditional agricultural operations are located along riparian habitats with scattered rural residential developments concentrated near the towns of Pinedale, Boulder, and Farson. Seasonal livestock grazing occurs throughout most portions of this segment, both on public land allotments and private lands, with relatively intense crop production north and east of Farson. Cattle, sheep, and horses are permitted in different portions of BLM grazing allotments. This segment does not include high density oil and gas development, as reserves appear limited in the area, and surface disturbances in this segment area are nominal. See Figure 24 for a more detailed map of this segment as well as Table 12 and Figure 25 for an overview of the crucial ranges and public land areas that overlap this segment.

Table 12. East of 191 Segment crucial range and public land areas overlap.

EAST OF WY-191	Stopover Areas	High Use	Medium Use	Low Use
Big Game Crucial Range	18,430	9,076	38,562	76,400
Conservation Easements	499	72	426	838
WGFC	406	20	571	1,273
Sage Grouse Core Area	29,625	14,785	57,722	106,141
BLM No Lease	14,099	4,450	21,534	37,342
BLM NSO	137	41	330	622

Threats and Current or Anticipated Risks

Residential subdivision: As the housing demand of Sublette County continues to grow, the primary threat to this segment is increasing rural residential developments, especially adjacent to the towns of Pinedale, Boulder, and Farson. While 838 acres are currently under CE, the potential for working ranches to be subdivided or converted to nontraditional land uses presents a long-term risk to portions of this segment.

Habitat fragmentation: Long stretches of woven-wire fence comprise another threat, mostly in the southern portion of the segment, which were erected at a time when more domestic sheep were present in the area. A particularly problematic portion of woven wire fence along 18 miles of the U.S. Highway 191 ROW north of Farson complicates antelope movement especially during severe winters. However, this issue is partially mitigated by opening paired gates in the ROW fence during times when livestock are not using the adjacent rangeland. Mining and energy development are not common in this segment (see Figure 26).

Cheatgrass and weed invasion: Cheatgrass presence is a concern due to increased threat of wildfire and competition with native species. The area most heavily infested by cheatgrass in Sublette County occurs in this segment.

Habitat quality: In portions of this segment, sagebrush habitat has experienced overuse and is generally of an older age class, resulting in less than optimal forage productivity. An increasing population of feral horses in the southern extent of this segment contributes to these conditions.

Conservation Opportunities to Mitigate Threats, Including Known Limitations

Residential subdivision: Numerous conservation opportunities exist within this migration segment, including continued establishment of CEs on private lands with high wildlife values to prevent additional residential development of open lands. Habitat leasing through the Grassland CRP program is supported by enrollment in federal funding programs. Funding opportunities are at an all-time high, particularly due to the USDA Migratory Big Game Initiative, but availability of funding still limits the number of projects that are implemented annually. CEs should be prioritized for funding within the Corridor.

Habitat fragmentation: To date, 112 miles of rangeland fence have been converted to meet wildlife-friendly standards within the segment and more efforts are currently underway (see Figure 27). In some places gates have been installed to be left open for wildlife movement when livestock are not present. Opportunities exist in additional areas to improve permeability of fences by modifying, removing or installing fence-crossing structures. Preventing additional surface disturbances from new developments in high use and stopover areas would ensure functionality of the corridor into the future. New fences should be located outside of high use areas and stopovers when possible.

Cheatgrass and weed invasion: Control of noxious, invasive weeds such as cheatgrass is ongoing in the segment and initial results are promising. Coarse soils support native rangelands but will continue to be threatened if cheatgrass is not managed throughout the Upper Green River Basin. A significant cheatgrass treatment project is underway and spearheaded by Sublette County Weed and Pest with WGFD, BLM, and private landowners collaborating on treatment implementation.

Habitat quality: Opportunities exist for vegetation treatments on private and public land that would contribute to healthy rangelands. Shrub and wet meadow enhancements are an example of beneficial treatments. These rangeland communities are important forage for antelope in fall and winter months. Annual leaders of these shrubs and healthy rangelands capable of early grass green-up benefit antelope during transitional seasons. Vegetation treatments should be prioritized in the corridor when possible.

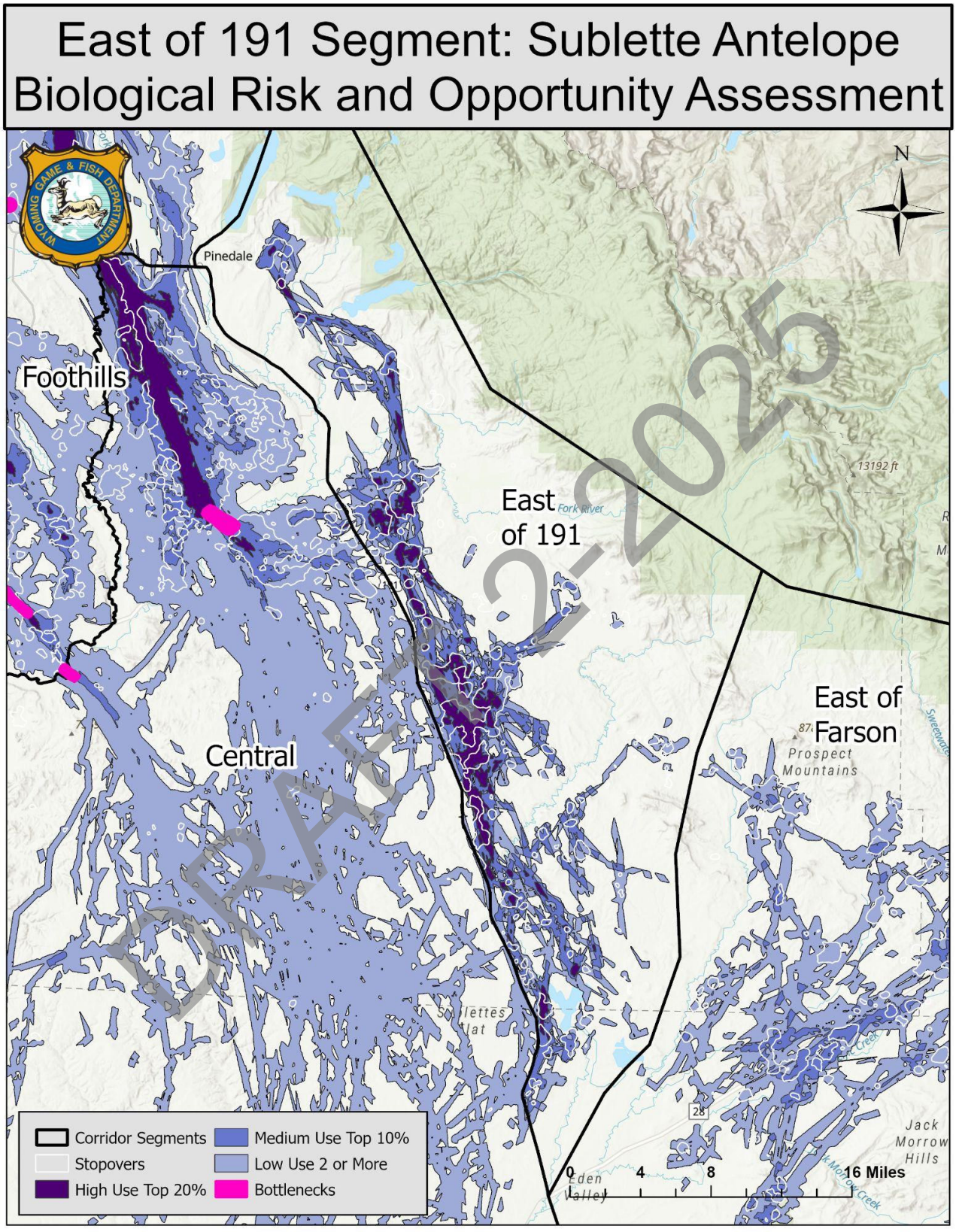

Figure 24. East of 191 Segment with use levels and stopovers.

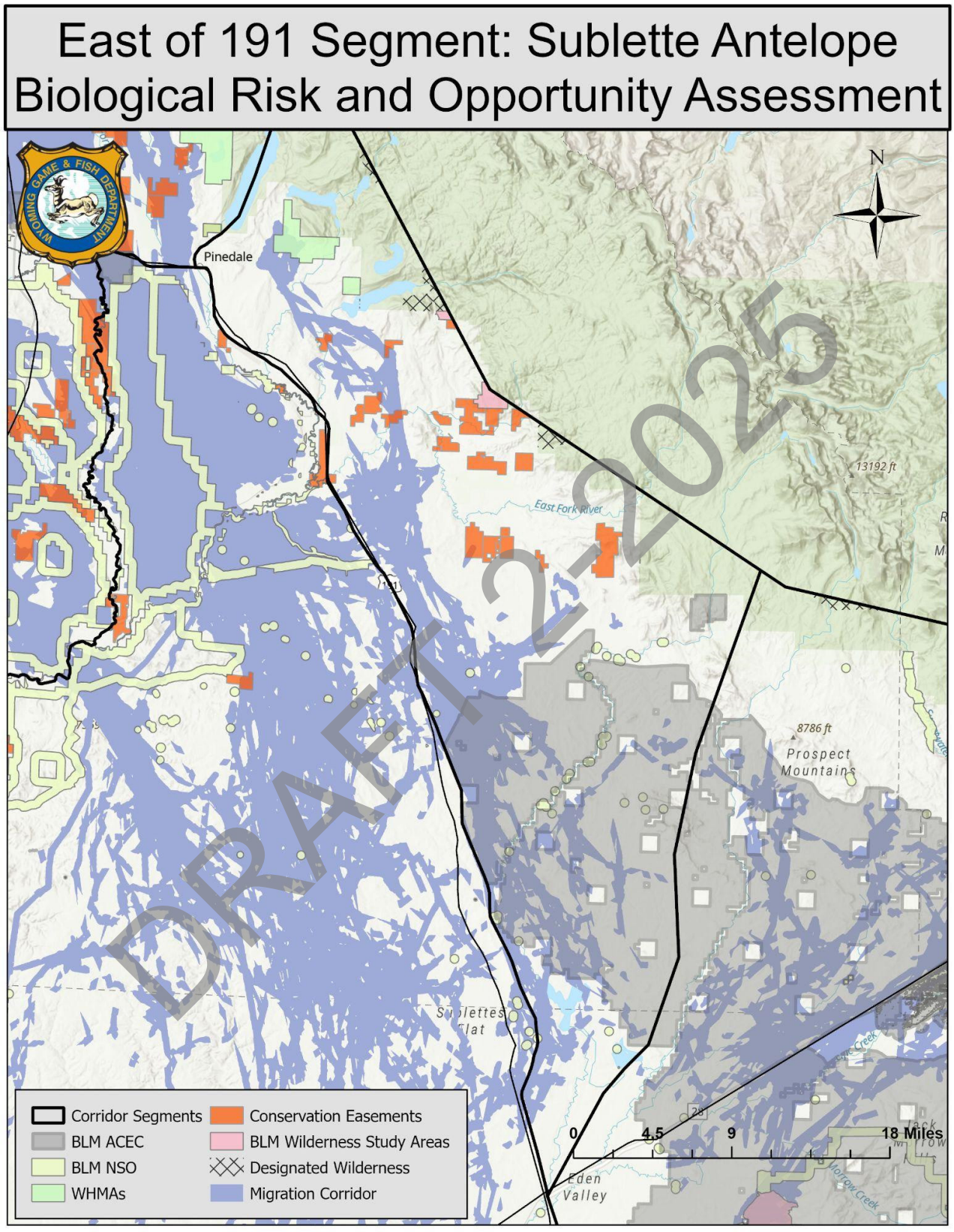

Figure 25. East of 191 Segment with CEs and other federal protections.

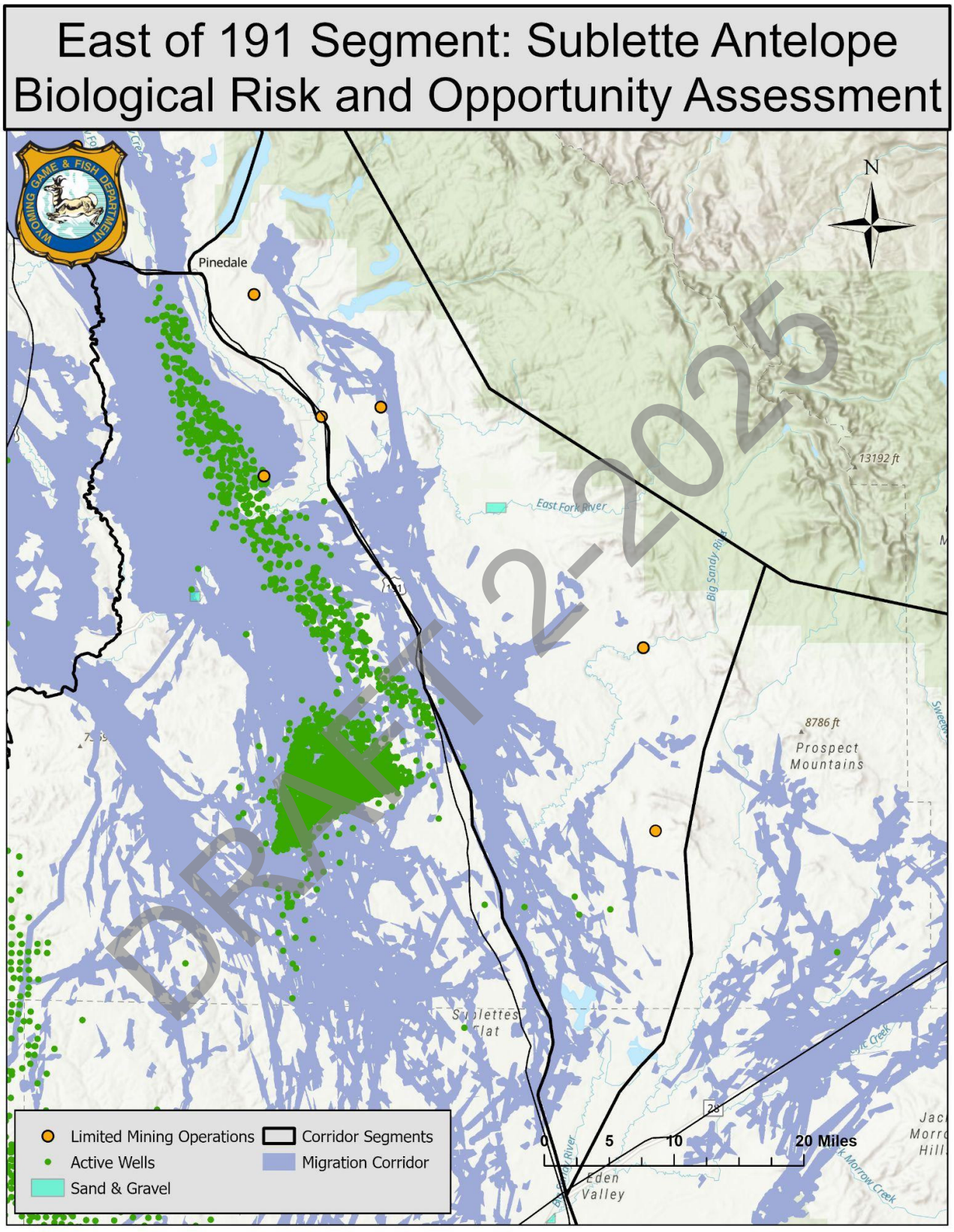

Figure 26. East of 191 Segment energy and mining development.

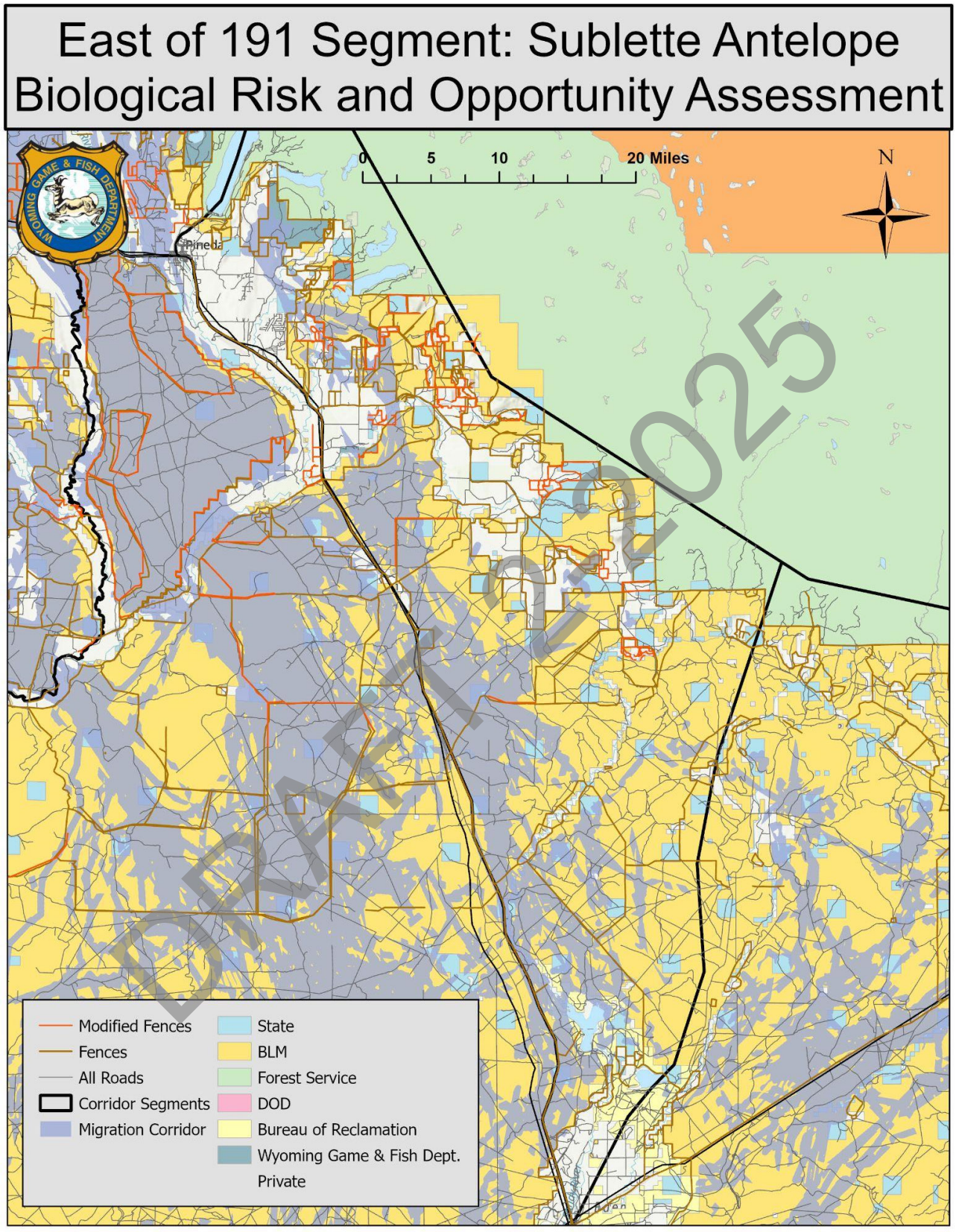

Figure 27. East of 191 Segment with roads and fences.

CENTRAL SEGMENT

General Description and Habitat Characteristics

The Central Segment of the Corridor consists of mostly lower elevation sagebrush habitats and can be considered the "heart" of the herd's Corridor. While there are year-round residents in this segment, including non-migratory and nomadic antelope, the Central Segment includes Crucial Winter Ranges used by antelope that migrate to more northerly segments during spring/summer. Many antelope wintering in the Central Segment also have been documented migrating further south during exceptionally severe winters. See Table 13 for a breakdown of landownership within this segment.

Table 13. Central Segment land ownership.

Land Ownership	High Use Acres	Med Use Acres	Low Use Acres	Stopover Acres	Bottlenecks
BLM	15,899	43,920	392,916	49,305	525
USFS	0	0	0	0	0
OSLI	341	1,290	13,983	1,915	470
Private	286	1,238	17,699	1,490	345
WGFC	0	0	12	0	0
Other	27	167	19,381	117	46
Totals	16,553	46,615	443,991	52,827	1,386

New Fork Bottleneck

The New Fork Bottleneck is located on BLM, OSLI, and private land and is the primary crossing point of the New Fork River for antelope that winter in habitats to the south. The width of the riparian corridor along the New Fork is noticeably reduced at this bottleneck, providing antelope with a relatively short crossing. This area has existing industrial disturbances along with a residential subdivision to the south, and antelope display limited flexibility in where they cross the New Fork, thus managers are concerned about the potential for new surface disturbances within this bottleneck. Five paired gates were constructed along the ROW fence for Sublette County Road 136 that are opened seasonally to improve permeability for migrating antelope (see Figure 28 and Appendix B). Habitat fragmentation from commercial development such as gravel pits and oil and gas facilities, and additional residential developments are the primary threats to this bottleneck. Preventing any new surface disturbance associated with developments, minimizing new fences, removing and modifying existing fences, and securing CEs are mitigation measures that would help conserve this bottleneck.

Green River Bottleneck

The Green River Bottleneck is in many ways similar to the New Fork Bottleneck which is located upstream. The Green River Bottleneck is located on a combination of BLM, OSLI, and private lands and is the primary crossing point of the Green River for antelope that winter further south, and occurs within a constriction of the riparian vegetation along the river. Within this bottleneck, the OSLI parcel on the north side of the Green River has a high potential for leasing as a gravel pit, which may jeopardize the continued functionality of the bottleneck. Because antelope only have one point they prefer to cross the Green and New Fork rivers within this segment of the Corridor, these bottlenecks are a high priority for connectivity. Habitat fragmentation from commercial development such

as gravel pits and oil and gas facilities and additional residential development are the primary threats to this bottleneck. Preventing any new surface disturbances associated with development, minimizing new fences, removing and modifying existing fences, and securing CEs are mitigation measures that would help conserve this bottleneck.

Trappers Overpass Bottleneck

See Foothills Segment narrative, above.

Land Uses

Most lands in the Central Segment of the Corridor are administered by the Pinedale and Rock Springs BLM field offices, and fossil fuel energy extraction dominates land use in this segment that includes three major oil and gas fields; the Pinedale Anticline in the north, the Jonah field in the south-central and the Fontenelle/Moxa Arch field in the southwest portion of this segment. Some dispersed recreation occurs throughout the segment including motorized ORV use, and big and small game hunting. Several relatively large traditional ranches are located primarily along the New Fork and Green River drainages, and seasonal livestock grazing occurs on all lands in this segment. It is notable that large stretches of undeveloped lands still exist in the central and southern portions of this segment, which are widely utilized by antelope during migration. See Table 14 and Figure 29 for an overview of the crucial ranges and public land areas that overlap this segment.

Table 14. Central Segment crucial range and public land areas overlap.

CENTRAL	Stopover Areas	High Use	Medium Use	Low Use
Big Game Crucial Range	50,939	16,318	45,182	255,606
BLM ACEC	1,050	1,808	2,047	2,178
Conservation Easements	0	0	0	1,111
WGFC	0	0	0	22
National Refuges	0	0	0	142
Sage Grouse Core Area	19,356	10,308	21,607	224,313
BLM No Lease	14,493	9,159	18,370	34,858
BLM NSO	8,325	4,411	8,092	27,708

Threats and Current or Anticipated Risks

Habitat fragmentation: Major threats in the Central Segment revolve around surface disturbances associated with energy and mineral extraction (see Figure 30). While recent gas prices have largely stymied increased exploration and production of traditional fossil fuel reserves, the field life projections of existing energy fields have been extended due largely to new recovery technologies increasing recoverable reserves. A longer operating timeline translates to increased periods of disturbance and delayed field reclamation which can negatively impact antelope migrations. Additionally, new mineral extraction efforts for novel products (e.g., helium) using portions of existing infrastructure have extended the life of some developments, and the prospect of developing carbon sequestration injection sites using existing oil and gas infrastructure might further extend the development horizon of important antelope habitat in the Central Segment. Utilizing existing energy infrastructure for future development is generally preferred over new surface disturbances in otherwise undeveloped habitat.

Residential development: Additional rural residential development is a significant threat to this segment, particularly associated with the river corridors and near the towns of Pinedale, Big Piney/Marbleton, and Daniel.

Cheatgrass and other weed invasion: Cheatgrass presence is a concern due to increased threat of wildfire and competition with native species.

Conservation Opportunities to Mitigate Threats, Including Known Limitations

Habitat fragmentation: An important mitigation tool is collaboration among project proponents, WGFD, and BLM to locate future development outside of high-use areas, stopover habitat, and bottlenecks. Additional opportunities exist to move forward with plugging and abandoning non-producing wells, which could be followed by timely reclamation of pads, pipelines, and roads in order to improve forage value and connectivity in these areas. Fence modification efforts have been underway for several years, but additional opportunities exist to expand this effort (see Figure 31). A final opportunity which began in 2023 is the removal of woven-wire perimeter fencing around numerous producing well pads in the Pinedale Anticline. Most of this fencing has been removed north of the New Fork River by an energy company and additional opportunities exist south of the river. Six paired gates were installed in 2021 along Wyoming Highway 351 between mileposts 13.9 and 18.8 (5-mile stretch) to improve fence permeability and reduce WVCs. This area annually experiences migration and winter range use by large groups of antelope and presents more opportunity to increase ROW fence permeability by modifying to wildlife friendly specifications across the entirety of Wyoming Highway 351.

Residential development: There have been several recent CEs placed on private lands with this segment, and continued efforts should be prioritized, particularly near existing bottlenecks. Extensive opportunities exist to implement voluntary conservation practices on private land such as CEs and habitat leasing through the Grassland CRP program. Funding opportunities are at an all-time high, particularly due to the USDA Migratory Big Game Initiative, but available funding still limits the number of projects that are implemented annually.

Cheatgrass and other weed invasion: Cheatgrass and other noxious weeds have been treated by local weed and pest districts and most of the energy companies have noxious weed control/eradication strategies for disturbed areas.

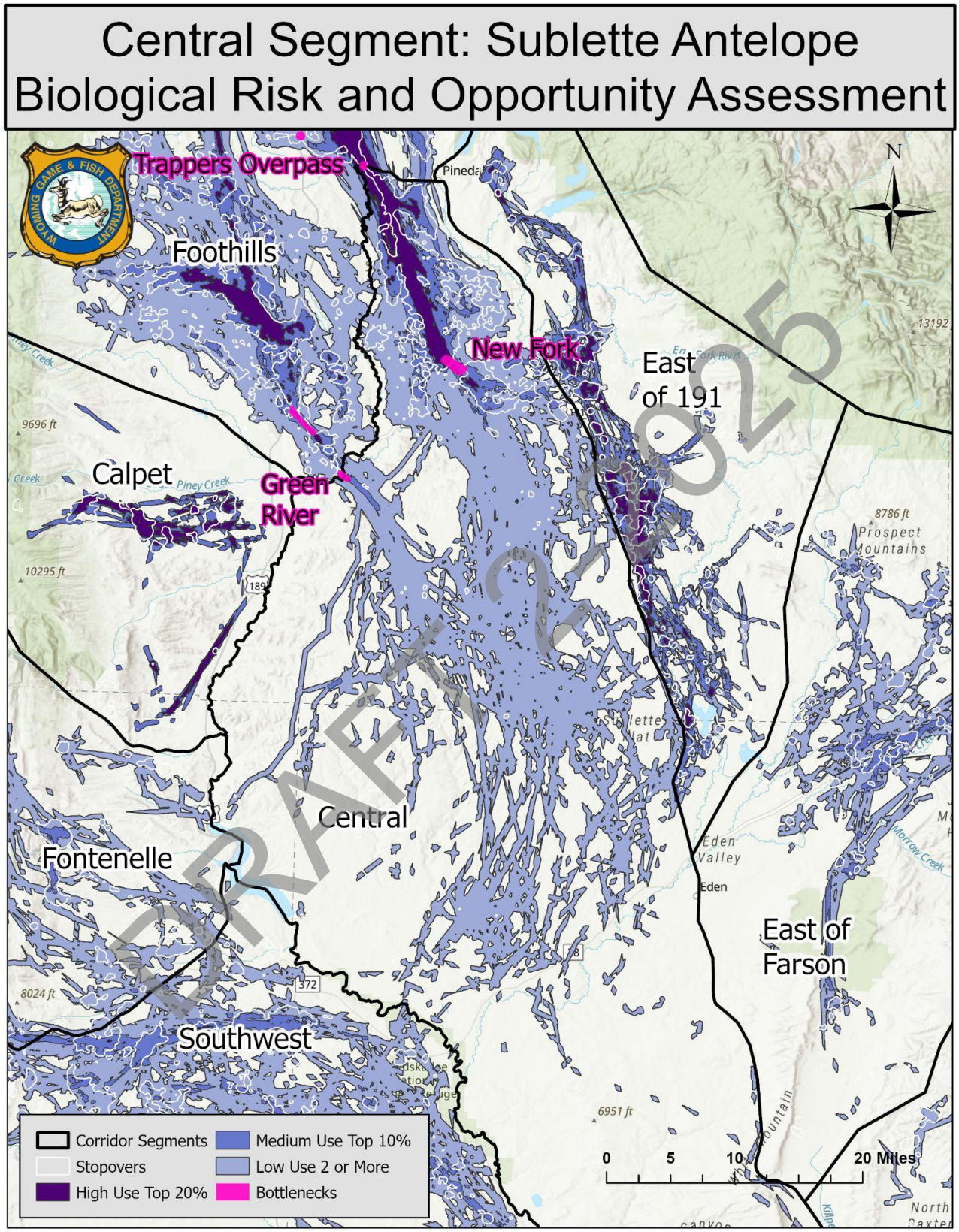

Figure 28. Central Segment with use levels, stopovers and bottlenecks.

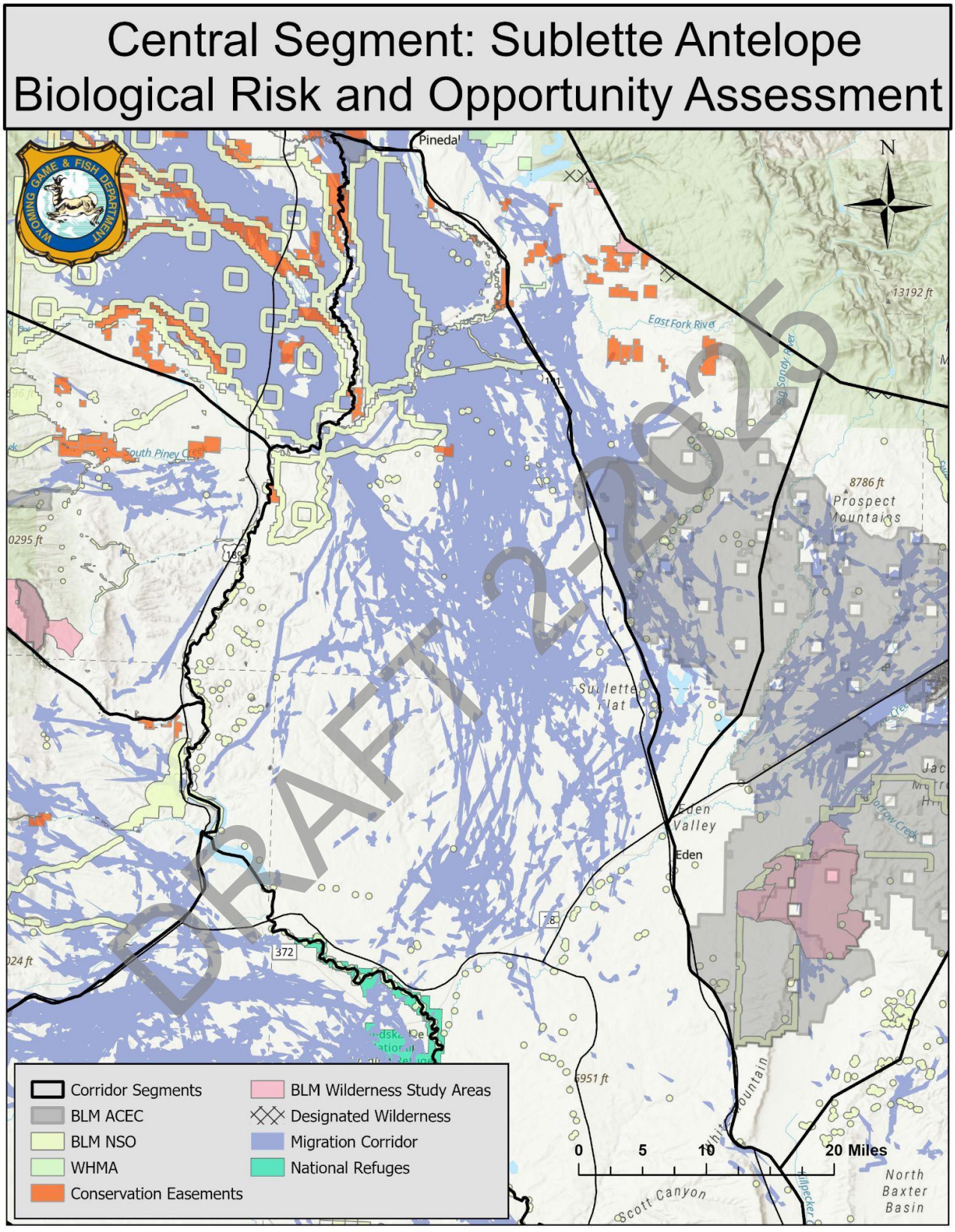

Figure 29. Central Segment with CEs and other federal protections.

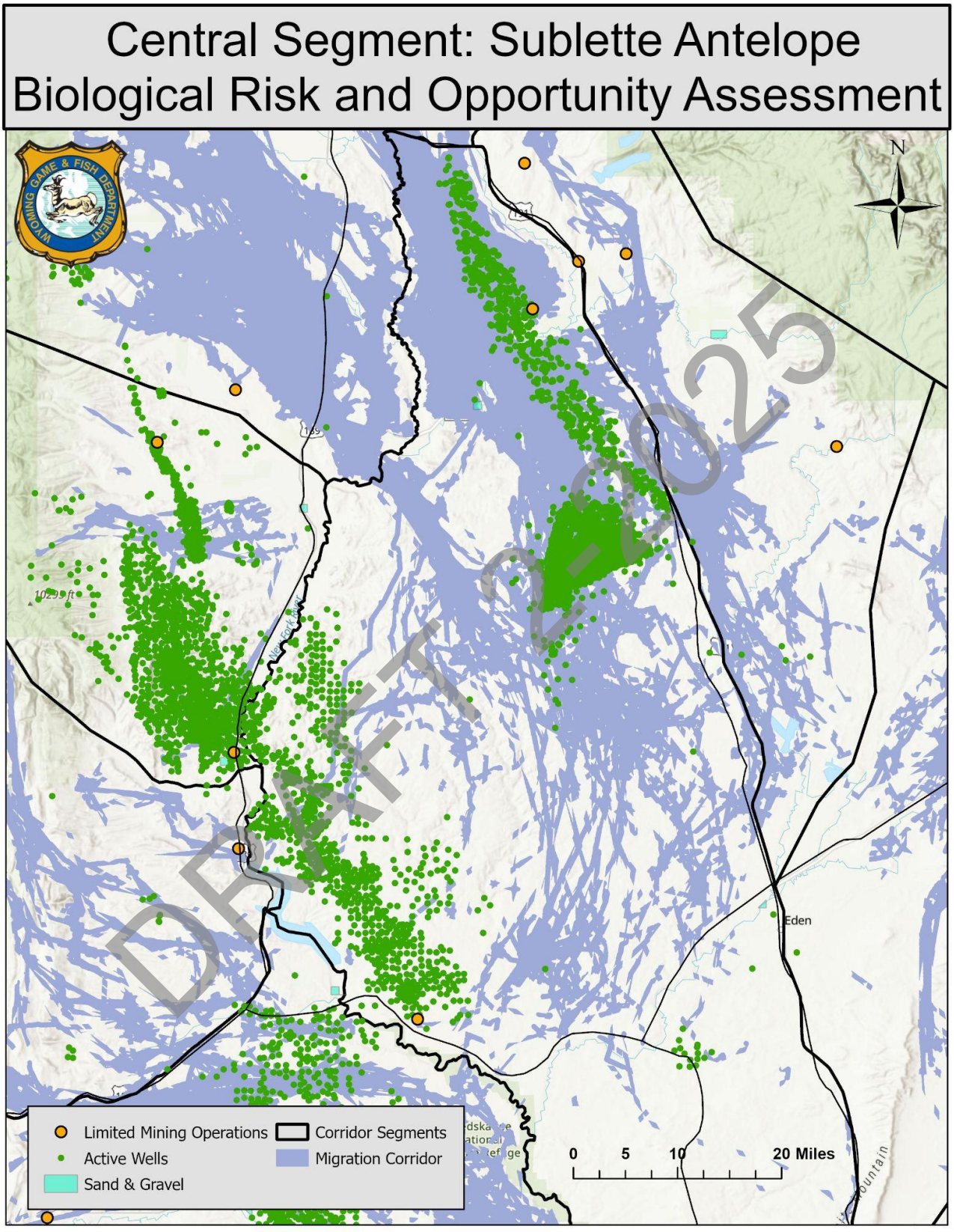

Figure 30. Central Segment energy and mining development.

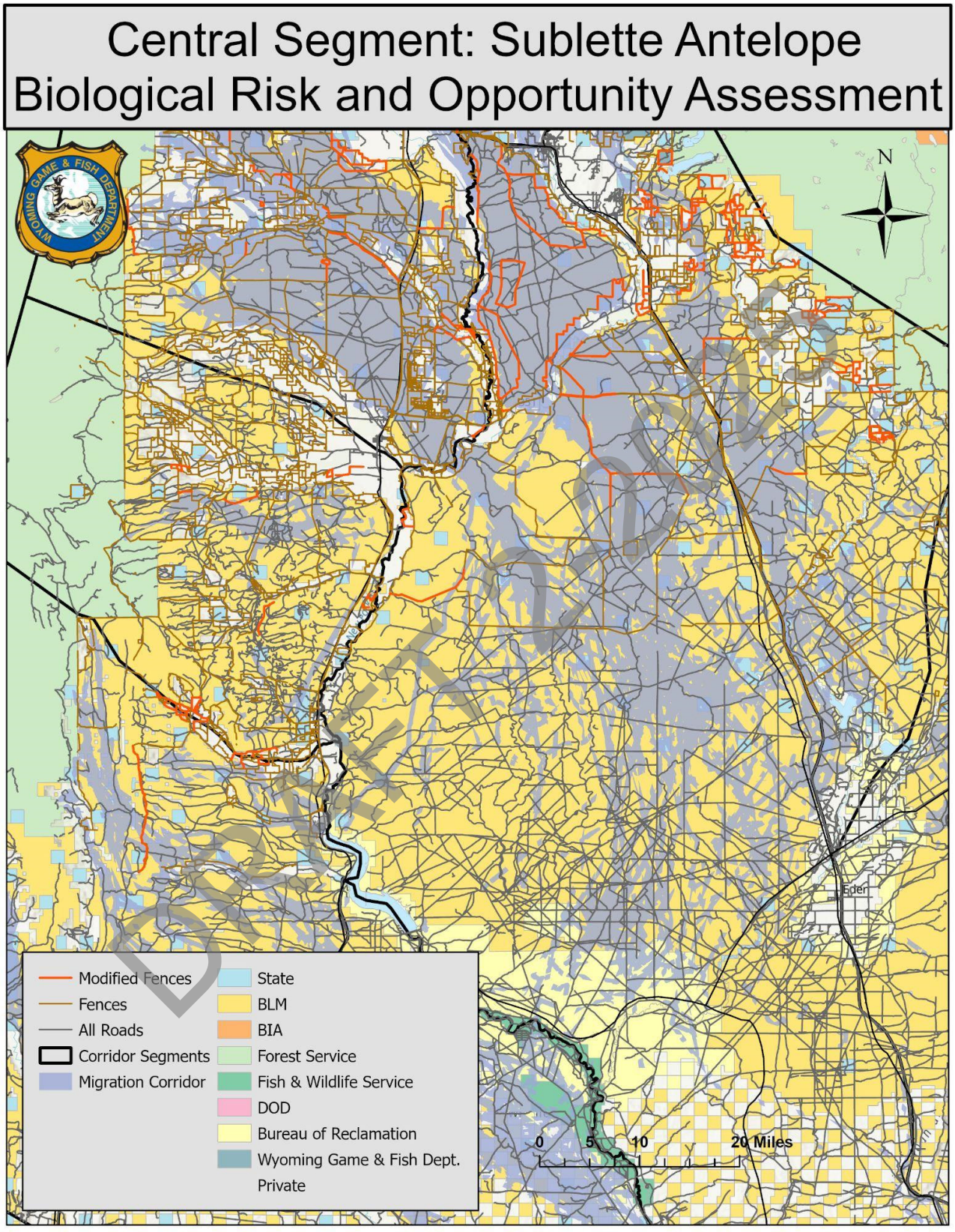

Figure 31. Central Segment with roads and fences.

CAPLET SEGMENT

General Description and Habitat Characteristics

The Calpet Segment is bordered on the west by the crest of the Wyoming Range. The northern border is South Cottonwood Creek east to the Green River, south to LaBarge Creek upstream again to the crest of the Wyoming Range. The antelope habitat within the Corridor is dominated by rolling sagebrush foothills and grasslands near the major drainages in valley bottoms. Antelope residing in this segment typically demonstrate short-distance migrations, moving generally upslope to the west during spring to higher elevation, more productive sagebrush and grassland flats during summer, then back eastward to lower elevation sagebrush habitats during winter. However, some antelope are year-round residents on winter ranges. Antelope in this segment have been observed on top of Darby and Fish Creek mountains in the summer at elevations of more than 10,000 feet. See Table 15 for a breakdown of landownership within this segment.

Table 15. Caplet Segment land ownership.

Land Ownership	High Use Acres	Med Use Acres	Low Use Acres	Stopover Acres	Bottlenecks
BLM	10,055	24,887	24,335	8,921	0
USFS	0	42	45	322	0
OSLI	419	1,454	1,455	311	0
Private	201	1,693	1,664	860	0
WGFC	0	0	0	0	0
Other	47	97	98	0	0
Totals	10,721	28,173	27,597	10,414	0

Land Uses

This segment is predominantly composed of BLM administered lands with scattered OSLI parcels and private holdings consisting of large, traditional agricultural operations primarily along riparian areas, with rural residential developments near the towns of Big Piney and LaBarge. Oil and gas development infrastructure dominates the Calpet, Deer Hills and southeast portion of the BTNF in this segment, with some of the wells approaching 100 years old. Other mineral extraction activities, including gasses such as helium, have recently garnered interest. Carbon sequestration activities using existing infrastructure are being investigated. Seasonal livestock grazing occurs on nearly all lands in the segment. Motorized and non-motorized recreation in this segment is present, and seasonally increases in the fall by big and small game hunters and in May by shed antler hunters. Motorized closures are in place on BLM lands from Jan. 1-April 30 in portions of big game Crucial Winter Ranges. See Figure 32 for a more detailed map of this segment as well as Table 16 and Figure 33 for an overview of the crucial ranges and public land areas that overlap this segment.

Table 16. Caplet Segment crucial range and public land areas overlap.

CALPET	Stopover Areas	High Use	Medium Use	Low Use
Big Game Crucial Range	9,887	10,718	27,692	27,115
BLM ACEC	118	0	769	770
Conservation Easements	191	0	165	163
BLM No Lease	222	0	160	159
BLM NSO	166	368	896	891

Threats and Current or Anticipated Risks

Habitat fragmentation: Major threats to antelope migration in the Calpet Segment revolve around continued surface disturbances associated with energy and mineral extraction (see Figure 34). While recent gas prices have largely stymied increased exploration and production of traditional fossil fuel reserves, the field life projections of existing energy fields have extended due to new recovery technologies increasing recoverable reserves. A longer operating timeline translates to increased periods of disturbance and delayed field reclamation that may negatively impact antelope migrations. Additionally, new mineral extraction efforts for novel products (e.g., helium) using portions of existing infrastructure has extended the life of some developments, and the prospect of developing carbon sequestration injection sites using existing oil and gas infrastructure might further extend the development horizon of sensitive habitats in the Calpet Segment. Utilizing existing energy infrastructure for future development is generally preferred over new surface disturbances in otherwise undisturbed habitat.

Residential development: Rural residential development continues to expand around the towns of Big Piney/Marbleton, and LaBarge.

Cheatgrass and weed invasion: Invasive species management has occurred and will continue to be prioritized in this area.

Conservation Opportunities to Mitigate Threats, Including Known Limitations

Habitat fragmentation: An important mitigation tool is collaboration among project proponents, WGFD, and BLM to locate future development outside of high-use areas and stopover habitat. There are additional opportunities to move forward with plugging and abandoning non-producing wells, which could be followed by timely reclamation of pads, pipelines, and roads in order to improve forage value and connectivity in these areas. Roads and fences are challenges for connectivity in this segment (see Figure 35). Installation of nine crossing structures along U.S. Highway 189 in the Dry Piney Creek area were completed in 2023, along with one archway underpass for antelope. These crossing projects should help facilitate movements across U.S. Highway 189 north of LaBarge and south of Big Piney.

Residential development: There have been several relatively recent CEs placed on private lands within this segment, and continued efforts to conserve working agricultural lands and open spaces are warranted. Extensive opportunities exist to implement voluntary conservation practices on private land such as CEs and habitat leasing through the Grassland CRP program. Funding opportunities are at an all-time high, particularly due to the USDA Migratory Big Game Initiative, but available funding still limits the number of projects that are implemented annually.

Cheatgrass and weed invasion: Cheatgrass and other noxious weeds have been treated by the local weed and pest district and most of the energy companies have noxious weed control/eradication strategies along disturbed areas.

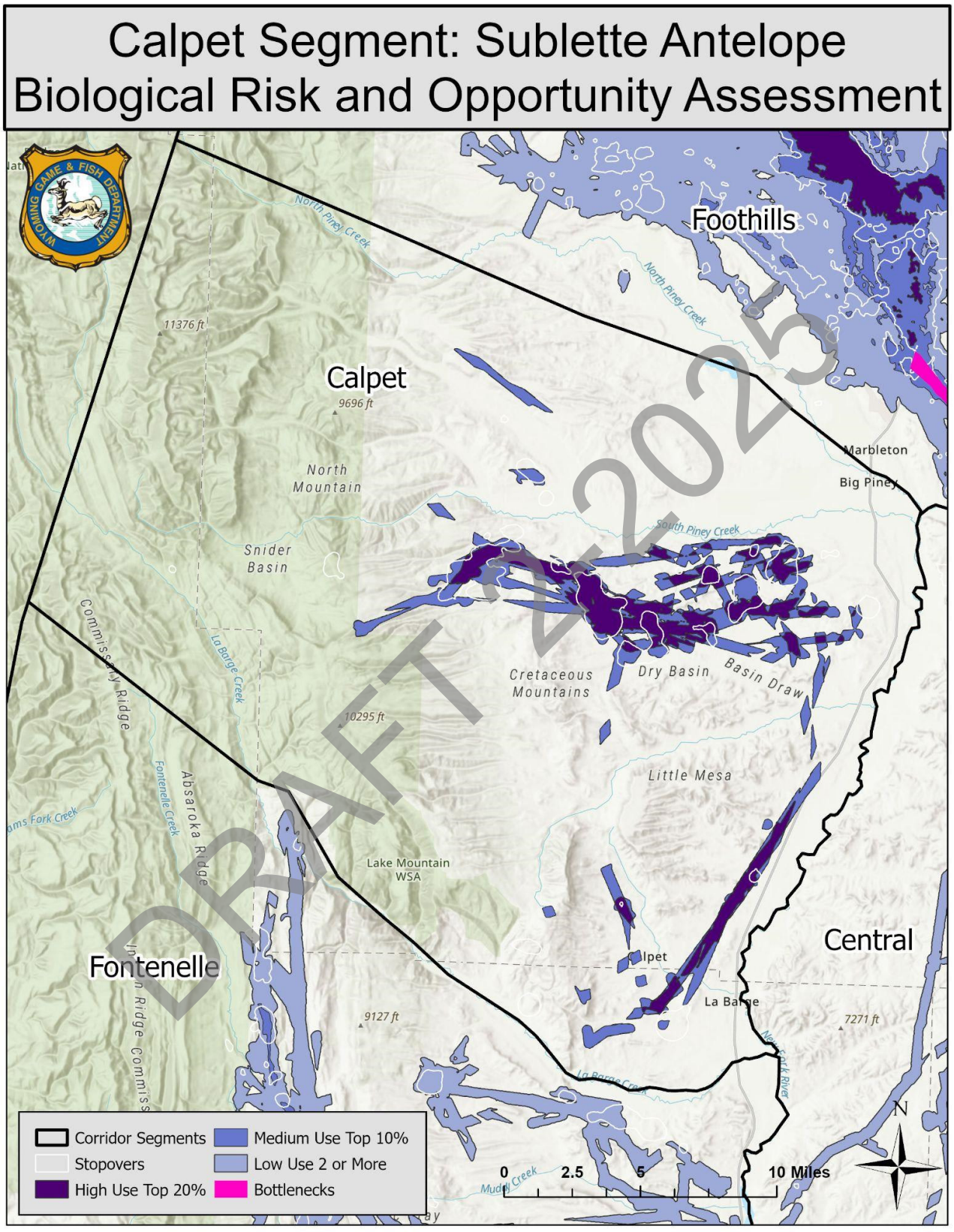

Figure 32. Caplet Segment with use levels and stopovers.

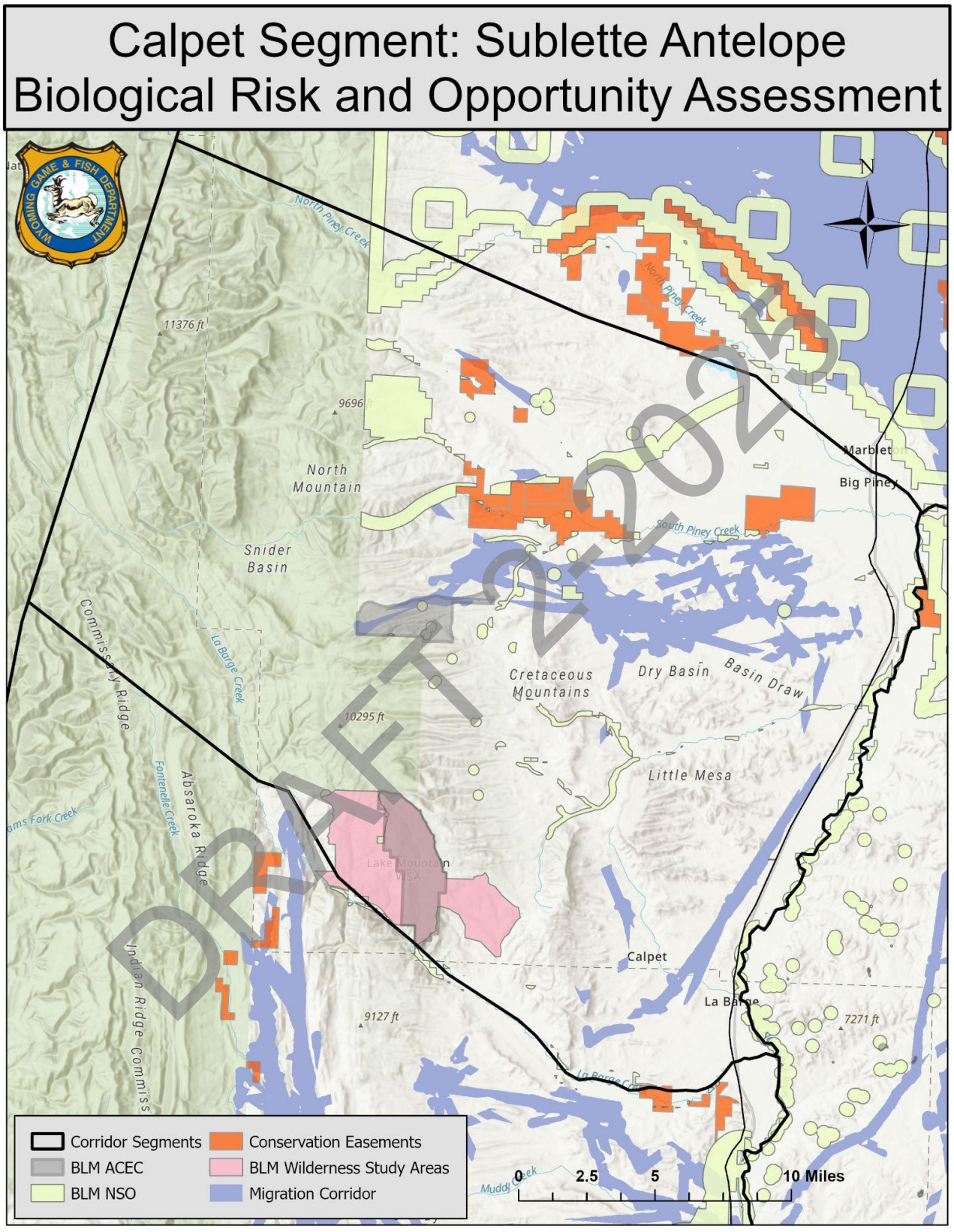

Figure 33. Caplet Segment with CEs and federal protections.

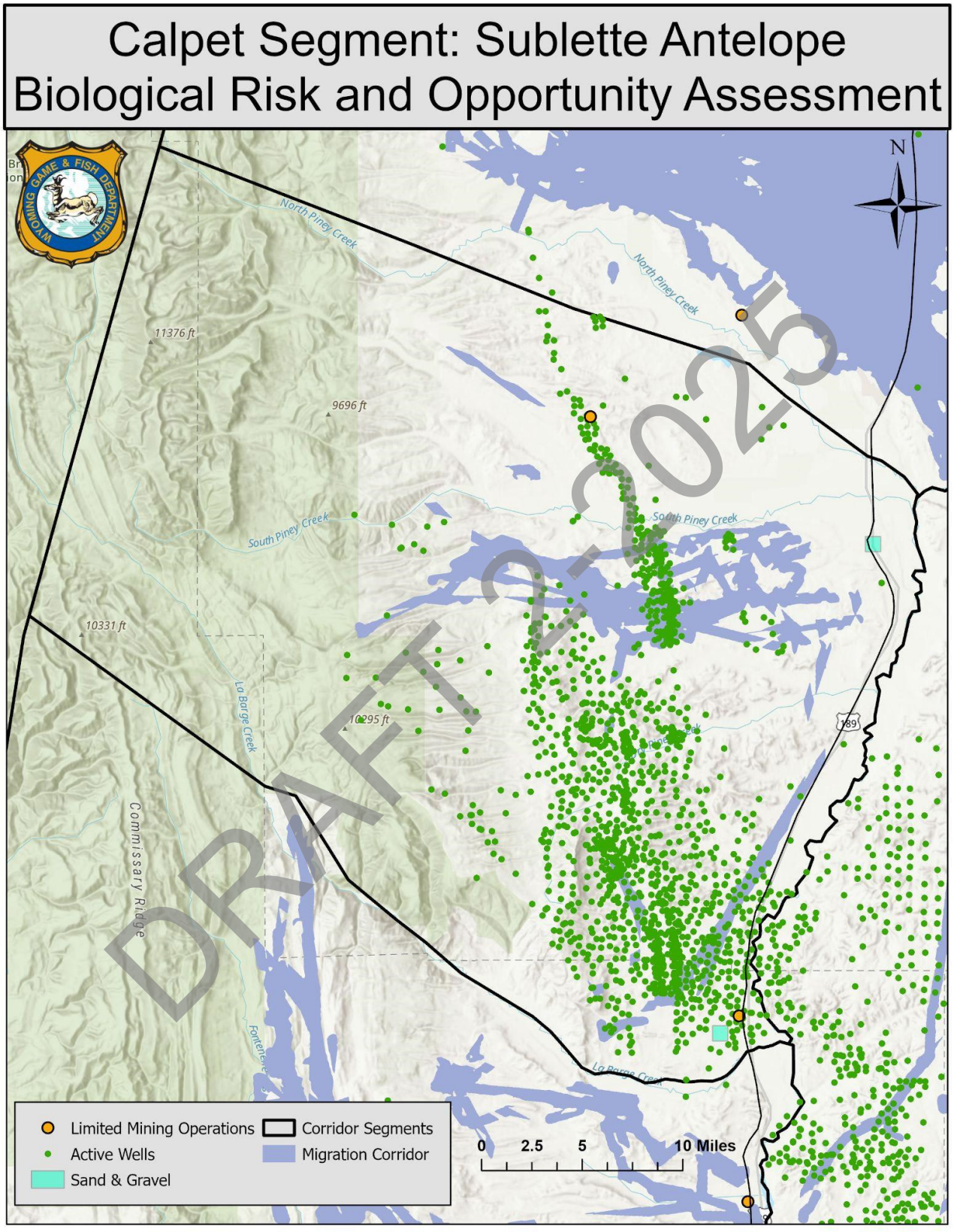

Figure 34. Caplet Segment energy and mining development.

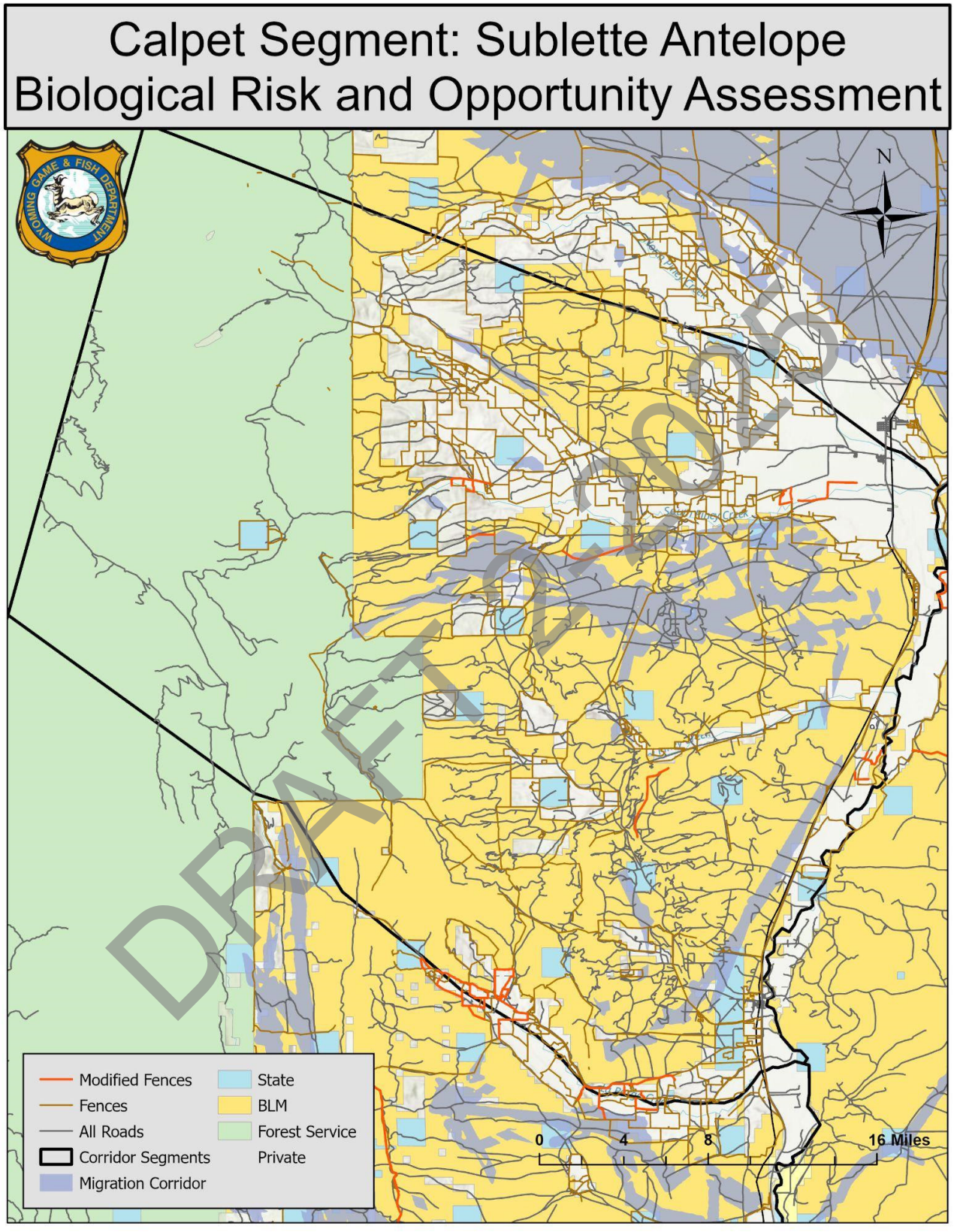

Figure 35. Caplet Segment with roads and fences.

FONTENELLE SEGMENT

General Description and Habitat Characteristics

The Fontenelle Segment is diverse, as it contains habitat that transitions from higher-elevation mesic summer range to winter range as antelope migrate to the southeast to the lower Green River Basin. This segment contains two predominant drainages, Fontenelle Creek and the Hams Fork River, which serve as summer range for some antelope and facilitates movements with transition to winter range. The habitat is dominated by Wyoming big sagebrush, mountain big sagebrush, and early sagebrush with scattered mountain shrub communities and aspen pockets at higher elevations. Basin big sagebrush occupies the ephemeral drainages. Substantial riparian areas and associated irrigated meadows exist along Fontenelle Creek and the Hams Fork River. Habitat enhancement efforts over the past 15 years have included mowing to diversify age structure in sagebrush and mixed shrub stands, prescribed fire in the Pole and Burdick creek vicinities to promote mosaics of earlier seral stage vegetation, and noxious weed control which has mostly targeted cheatgrass. See Table 17 for a breakdown of landownership within this segment.

Table 17. Fontenelle Segment land ownership.

Land Ownership	High Use Acres	Med Use Acres	Low Use Acres	Stopover Acres	Bottlenecks
BLM	0	3,272	94,353	16,151	0
USFS	0	0	305	65	0
OSLI	0	778	7,868	744	0
Private	0	224	16,429	2,786	0
WGFC	0	0	0	0	0
Other	0	0	15	0	0
Totals	0	4,274	118,971	19,746	0

Land Uses

This segment is predominantly composed of BLM land, with scattered OSLI parcels and private inholdings. The exception being ownership along the Hams Fork River and Fontenelle Creek, which is mostly private with multiple landowners. Oil and gas development exists but is currently dispersed and has minimal impact on the permeability and disturbance of this landscape. Seasonal livestock grazing occurs throughout this segment. Renewable energy has been explored in this segment with potential access to a transmission line corridor that is proposed for construction. Motorized and non-motorized recreation in this segment is not substantial, but greatly increases during fall by big and small game hunters as well as in May by shed antler hunters. Motorized closures are in place on BLM lands from Jan. 1-April 30 in the area between LaBarge Creek and U.S. Highway 189 (Miller Mountain Area). See Figure 36 for a more detailed map of this segment as well as Table 18 and Figure 37 for an overview of the crucial ranges and public land areas that overlap this segment.

Table 18. Fontenelle Segment crucial range and public land areas overlap.

FONTENELLE	Stopover Areas	Medium Use	Low Use
Big Game Crucial Range	14,755	2,306	80,812
Sage Grouse Core Area	17,114	2,935	94,839
Conservation Easements	195	3	965
WGFC	210	109	647
BLM NSO	978	206	5,750

Threats and Current or Anticipated Risks

Habitat fragmentation: Current and anticipated threats and risks within this segment that affect the functionality of the Corridor are predominately centered around potential industrial development (see Figure 38) and fencing (see Figure 39). Private ownership along Fontenelle Creek and the Hams Fork River have existing fencing and potential for new fencing which inhibits movement. Potential exists for new fence construction along existing allotment boundaries, as well as exclusion of livestock from roadways. With known industrial development coming to the Kemmerer area, there is a likelihood for increased traffic along U.S. Highway 189 at the southern and eastern sides of the segment that could influence movement. The Gateway West transmission line is proposed for construction to the south of this segment, and will likely increase potential for development of renewable energy facilities within reasonable distances to this transmission line.

Cheatgrass and weed invasion: Cheatgrass is currently managed in this area through partnership with Lincoln County Weed and Pest. Increased roads and development may also provide a path for invasion from invasive weed species.

Conservation Opportunities to Mitigate Threats, Including Known Limitations

Habitat fragmentation: An important mitigation tool is collaboration between project proponents, WGFD, and BLM to locate future development outside of high-use areas and stopover habitat. Opportunities exist within this segment for mitigation and limiting current and future threats. The majority of this segment falls within the scope of the BLM's management and opportunities exist for fence modifications and habitat improvements on these lands. Additionally, there is opportunity for fence modifications and conversions to facilitate movement on private and OSLI lands within this segment. Extensive opportunities exist to implement voluntary conservation practices on private land such as CEs and habitat leasing through the Grassland CRP program. Funding opportunities are at an all-time high, particularly due to the USDA Migratory Big Game Initiative, but available funding still limits the number of projects that are implemented annually.

Cheatgrass and weed invasion: There are opportunities for invasive species treatments and habitat improvements within this segment.

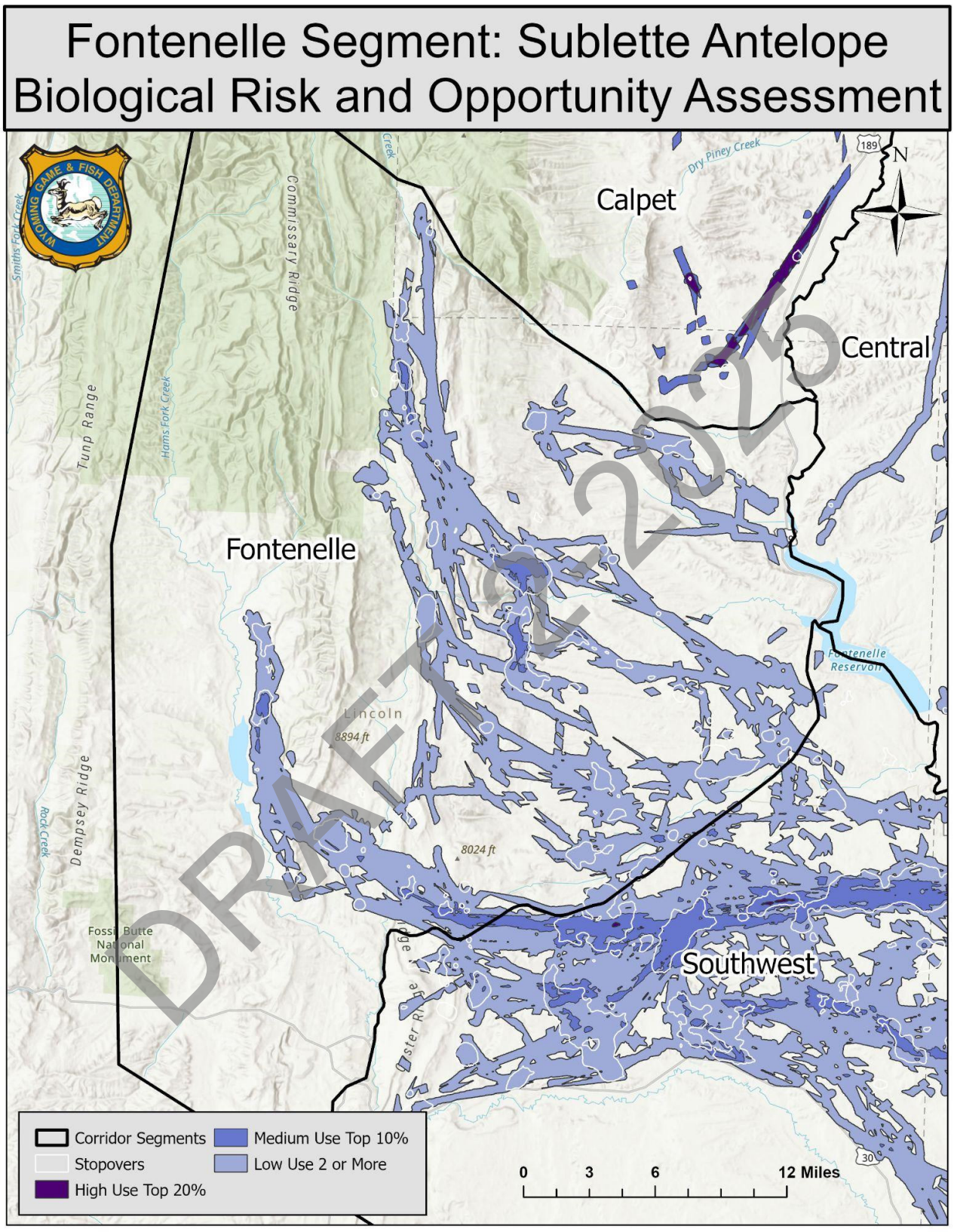

Figure 36. Fontenelle Segment with use levels and stopovers.

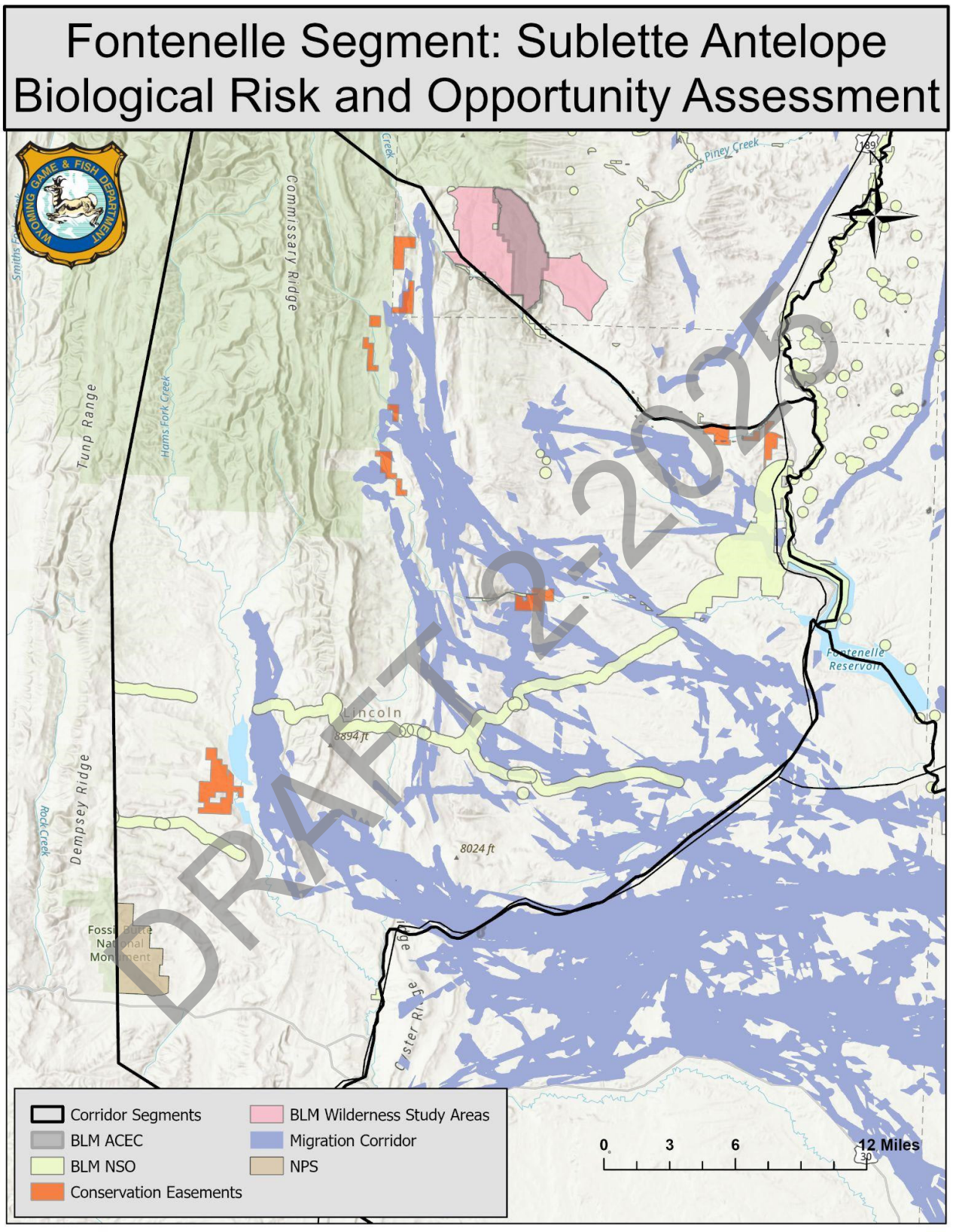

Figure 37. Fontenelle Segment with CEs and federal protections.

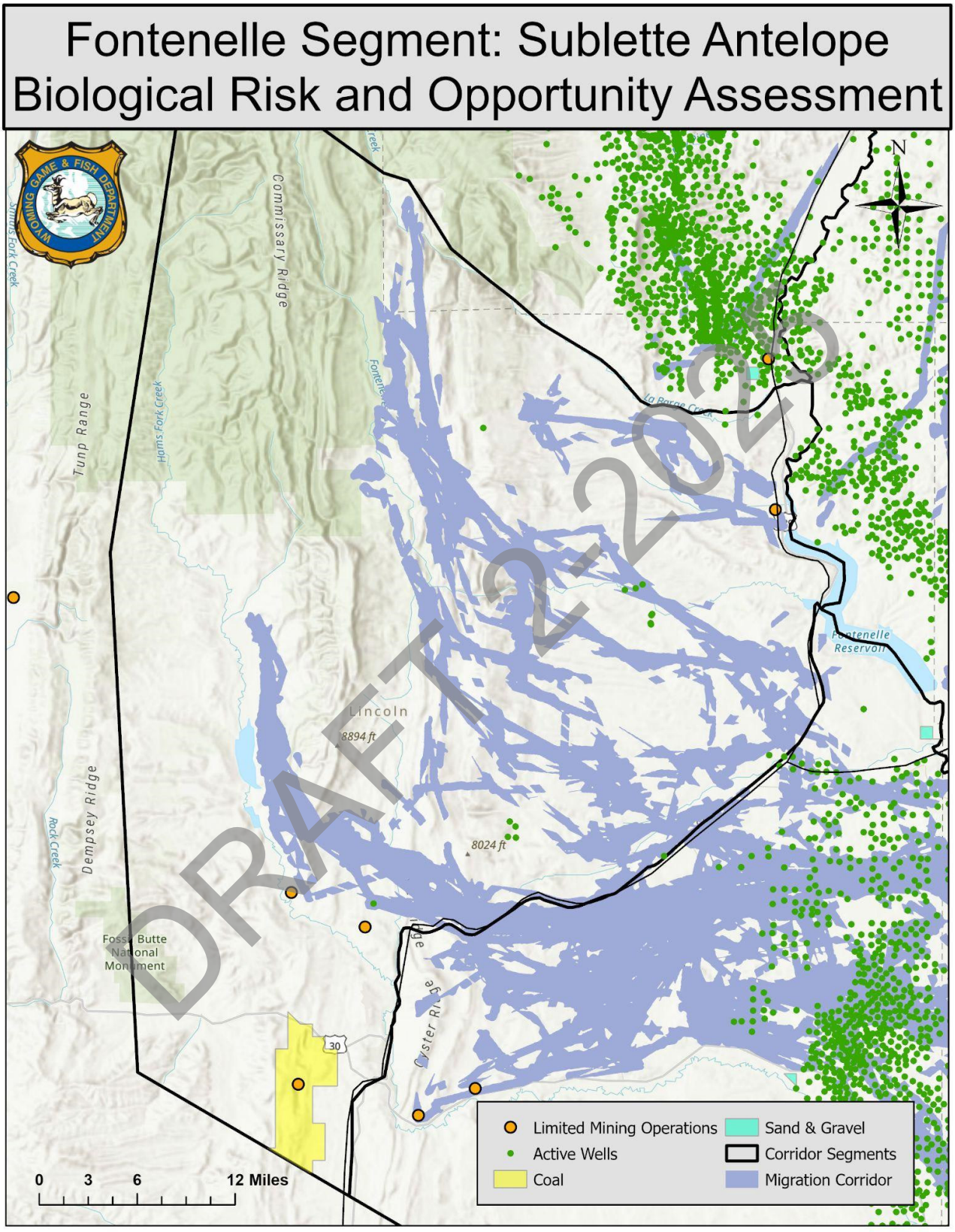

Figure 38. Fontenelle Segment energy and mining development.

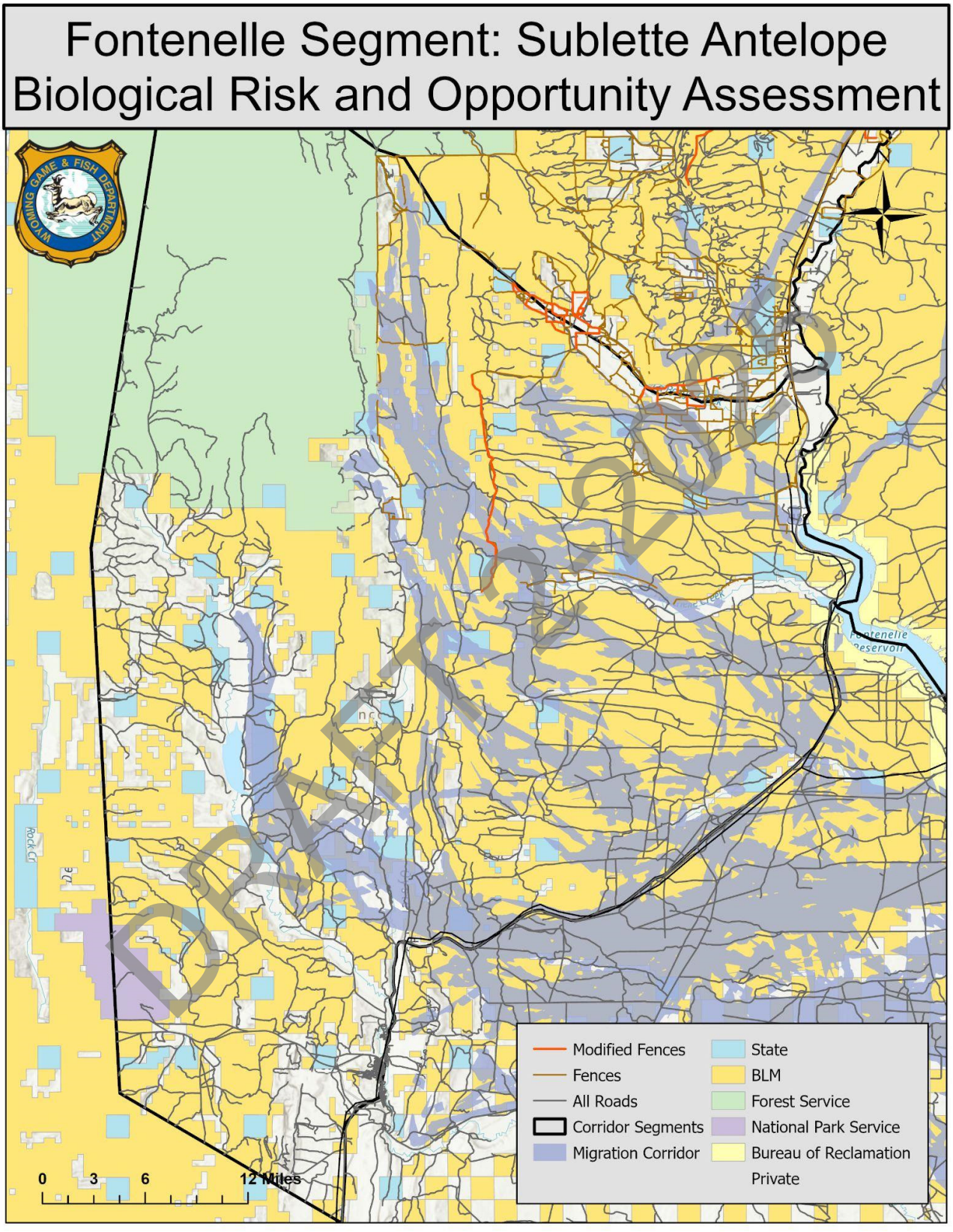

Figure 39. Fontenelle Segment with roads and fences.

SOUTHWEST SEGMENT

General Description and Habitat Characteristics

The Southwest Segment represents movements of antelope coming from the Hams Fork and Fontenelle drainages, as well as antelope that inhabit areas along Shute Creek and the lower Green River. Movements in this segment are primarily to the southeast in the winter for individuals seeking winter range along the Green River and Interstate 80. The majority of the Southwest Segment is comprised of expansive areas of xeric Wyoming big sagebrush habitats with interspersed areas of Gardner's saltbush, bud sagebrush, spiny hopsage, and greasewood-lined drainages. It contains areas of year-long antelope use as well as Crucial Winter Range along the Blacks Fork River, lower Green River, and along Interstate 80. Habitat improvements consist of historic water guzzler developments in the Opal bench area, sagebrush mowing treatments during the early 2000s associated with habitat mitigation for the Moxa Arch gas field development, and replacing 22 miles of woven-wire fence to wildlife-friendly specifications along the boundary between the BLM Kemmerer and Rock Springs field offices in the checkerboard land ownership area. See Table 19 for a breakdown of land-ownership within this segment.

Table 19. Southwest Segment land ownership.

Land Ownership	High Use Acres	Med Use Acres	Low Use Acres	Stopover Acres	Bottlenecks
BLM	105	20,624	116,275	24,915	875
USFS	0	0	0	0	0
OSLI	0	716	5,313	1,560	0
Private	0	6,979	85,847	10,414	2,047
WGFC	0	0	0	0	0
Other	0	1,571	32,643	2,597	19
Totals	105	29,891	240,078	39,486	2,941

Blacks Fork Bottlenecks

The Blacks Fork Bottleneck is located at the southernmost portion of the Corridor west of Rock Springs in checkerboard land ownership. This bottleneck is situated on a sagebrush flat between the Green River and badland breaks to the west. Historically, the area around this bottleneck has seen industrial development largely from gravel mining operations, along with nearby trona mining and processing facilities. Recently, this area has experienced new industrial developments from additional gravel pits and a utility-scale solar facility on the aforementioned sagebrush flat used by antelope to migrate to winter range. The solar facility, which is fenced with 10-foot-tall chain link fencing, has been particularly problematic for antelope trying to access Crucial Winter Ranges, especially during severe winters. During the 2019-20 winter, approximately 1,500 antelope attempting to migrate to winter range were blocked by the solar facility fencing and were forced onto Wyoming Highway 372, creating a safety hazard for motorists and increased vehicle mortality for migrating antelope. Recent collaring efforts (2019-2023) documented the movements of 38 individuals in proximity of this defined bottleneck. Of the 38 antelope, consisting of both resident and migratory individuals, 35 individuals have line movement data that falls within the Blacks Fork bottleneck. Collared individuals do not utilize the riparian river bottom habitats on the Green River and Blacks Fork rivers during the winter, primarily due to broken topography and accumulating snow loads. During harsh

winters, large groups of antelope, with upwards of 1,500 or more individuals, commonly move through this bottleneck to Crucial Winter Ranges, often seeking southern aspect slopes along White Mountain and windblown flats near Interstate 80. During the extreme winter of 2022-23, antelope that were able to make it to areas south of this bottleneck experienced higher survival relative to the rest of the herd (see Figure 40 and Appendix B).

Land Uses

The northern and western portions of this segment have disturbance in the form of oil and gas from the Moxa Arch infill gas field. Other major land uses occurring within the segment include trona mining, solar energy development, and gravel mining. Seasonal livestock use occurs throughout this segment. Land ownership transitions from predominantly BLM in the north to checkerboard ownership in the southern half of the segment. Other ownership includes Bureau of Reclamation lands and USFWS lands for Seedskadee National Wildlife Refuge, which is located along the Green River and overlaps with portions of the Corridor. See Table 20 and Figure 41 for an overview of the crucial ranges and public land areas that overlap this segment.

Table 20. Southwest Segment crucial range and public land areas overlap.

SOUTHWEST	Stopover Areas	High Use	Medium Use	Low Use
Big Game Crucial Range	20,752	75	17,079	147,709
BLM ACEC	0	0	0	62
National Refuges	360	0	33	3,699
Sage Grouse Core Area	3,573	0	6,097	31,554
BLM No Lease	358	0	33	3,725
BLM NSO	412	0	0	1,785

Threats and Current or Anticipated Risks

Habitat fragmentation: Current threats exist with considerable infrastructure being placed throughout the Southwest Segment. The northern end of the segment has varying levels of gas field development (see Figure 42). Associated infrastructure and human presence creates disturbance, as well as increases habitat fragmentation. The Gateway West transmission corridor is proposed adjacent to the Southwest Segment, likely increasing the possibility for renewable energy development. This segment also contains some barriers which reduce permeability for antelope movement, including highways and railroads with associated fencing. Major roadways influencing antelope movements include U.S. Highway 30 and U.S. Highway 189, along with Wyoming Highway 372 and Wyoming Highway 374.

Although it technically does not intersect the Corridor, Interstate 80 is the southern boundary of the segment and essentially functions as an impermeable barrier to antelope movement (Kauffman et al. 2018). During severe winters, antelope tend to continue moving south until they encounter Interstate 80. Upon reaching Interstate 80 during winter, movements parallel the interstate west along the Blacks Fork River, as well as to the east along White Mountain. While managers are not aware of any antelope movement data prior to construction of the interstate, it is probable antelope historically migrated further south, especially during severe winters. Access to winter ranges south of Interstate 80 could provide an additional buffer for overwinter antelope survival, especially during severe winters, although the extent to which these areas were traditionally used is unknown.

Development of infrastructure associated with trona and gravel mining as well as industrial solar occurs in the southeast portion of this segment. Much of this development occurs on a relatively narrow bench which constricts antelope movements to Crucial Winter Range due to deep snow

loads which may occur on either side of the flat, including within a series of breaks to the west and the river bottom to the east. Future risks to functionality of the Southwest Segment include expansion of previously mentioned disturbances, including mining operations, energy development, and associated infrastructure. Portions of the segment have the potential for expanded renewable energy and carbon capture development.

Cheatgrass and weed invasion: Cheatgrass is currently managed in this area. Increased roads and development provides an opportunity for invasion from cheatgrass and other weed species.

Habitat quality: Rangeland conditions are generally late seral and present opportunities for vegetation enhancements throughout the segment.

Conservation Opportunities to Mitigate Threats, Including Known Limitations

Habitat fragmentation: An important mitigation tool is collaboration between project proponents, WGFD, and BLM to locate future development outside of high-use areas, stopover habitat, and bottlenecks. Other important conservation opportunities in this segment are fence modifications (see Figure 43) and installing fence crossing structures. Fencing surrounding roadways and solar infrastructure may be modified to help facilitate movements. Solutions, such as utilizing existing paired ROW gates or installing additional paired ROW gates, could be explored for areas along U.S. Highway 30 to reduce movement challenges. Antelope moving to and from winter ranges in this segment are still navigating the existing infrastructure associated with mining, gravel, and solar development. However, increased development in portions of this segment may approach thresholds that further constrain and potentially impede movement through this area, highlighting the need for collaborative planning efforts to strategically place additional development if proposed.

Cheatgrass and weed invasion: Much of this area is expected to experience increased energy development in the future along with threats from invasive grasses. Best practices for ground disturbing activities should be applied to reduce the establishment and spread of invasives.

Habitat quality: Managers have reviewed potential Zeedyk or beaver dam analog projects for riparian and wet meadow restoration in the northern parts of this segment.

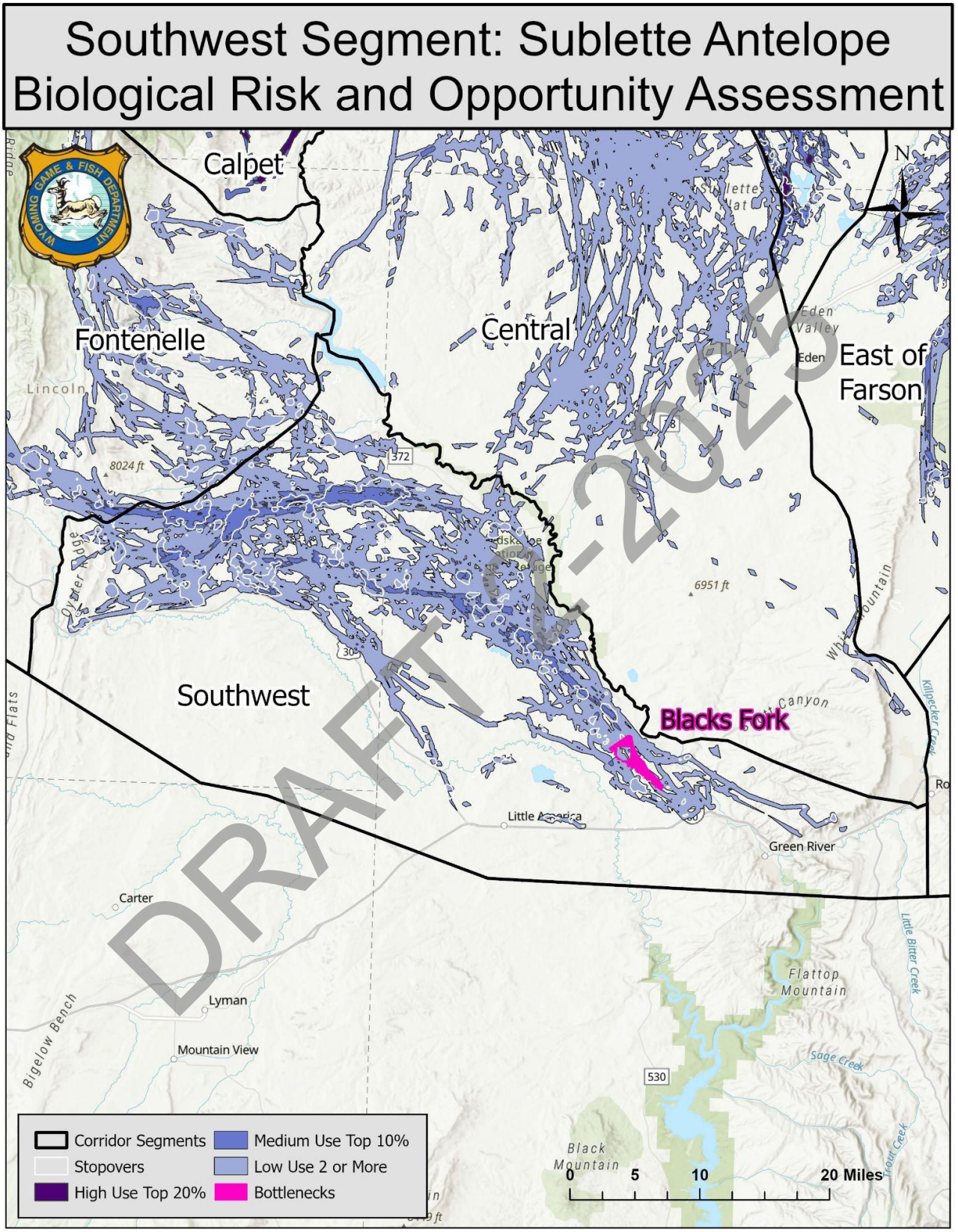

Figure 40. Southwest Segment with use levels, stopovers and bottlenecks.

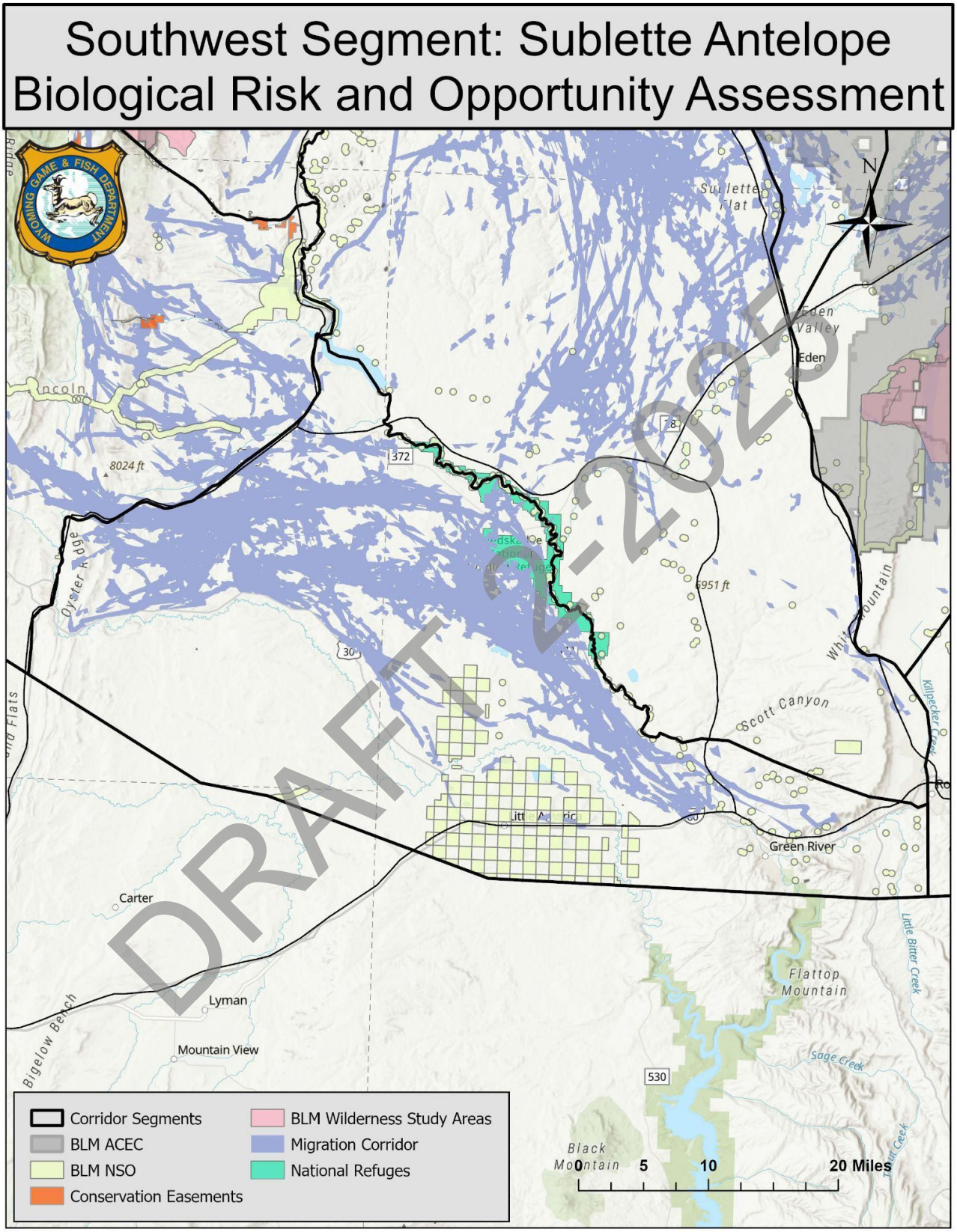

Figure 41. Southwest Segment with federal protections.

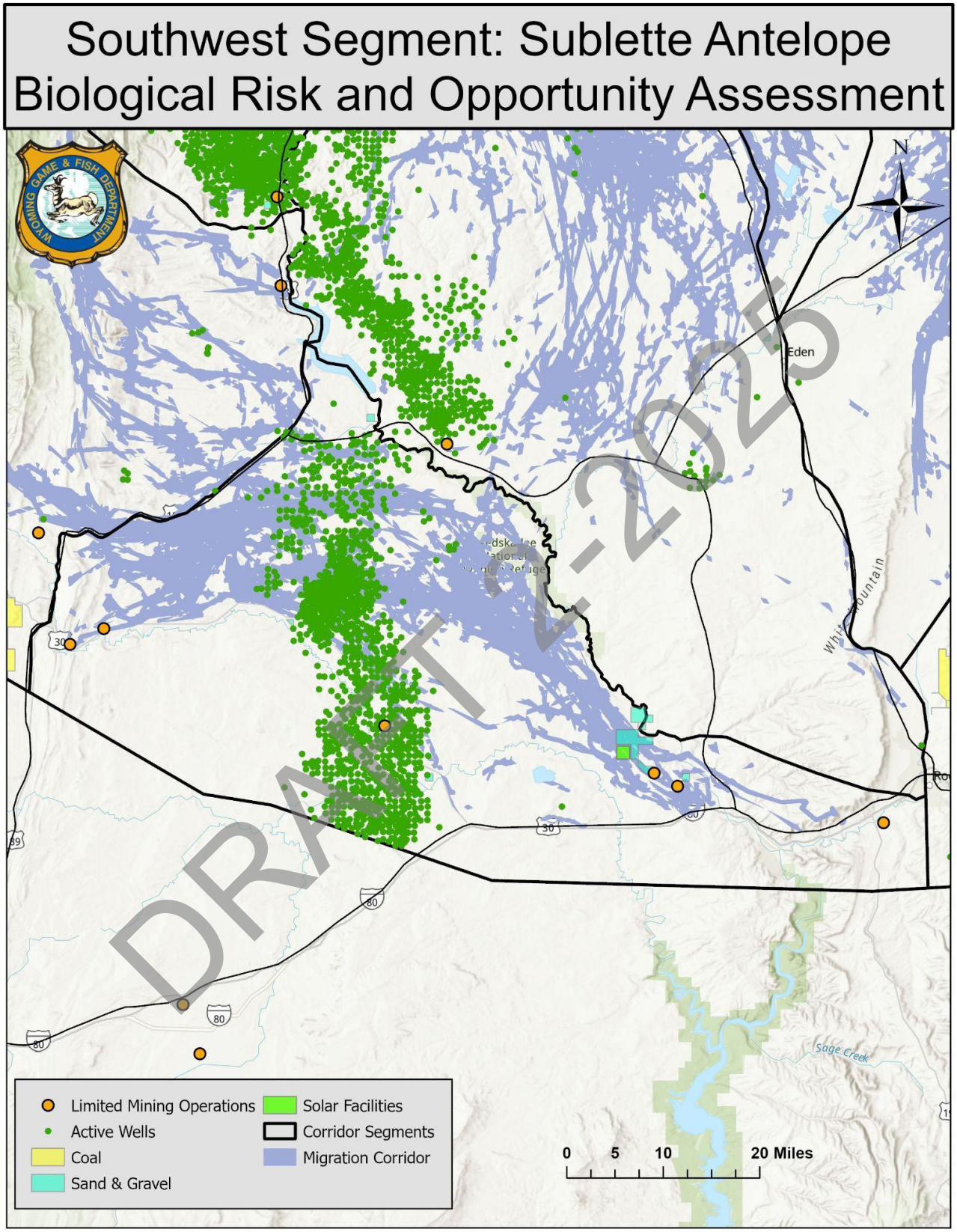

Figure 42. Southwest Segment energy and mining development.

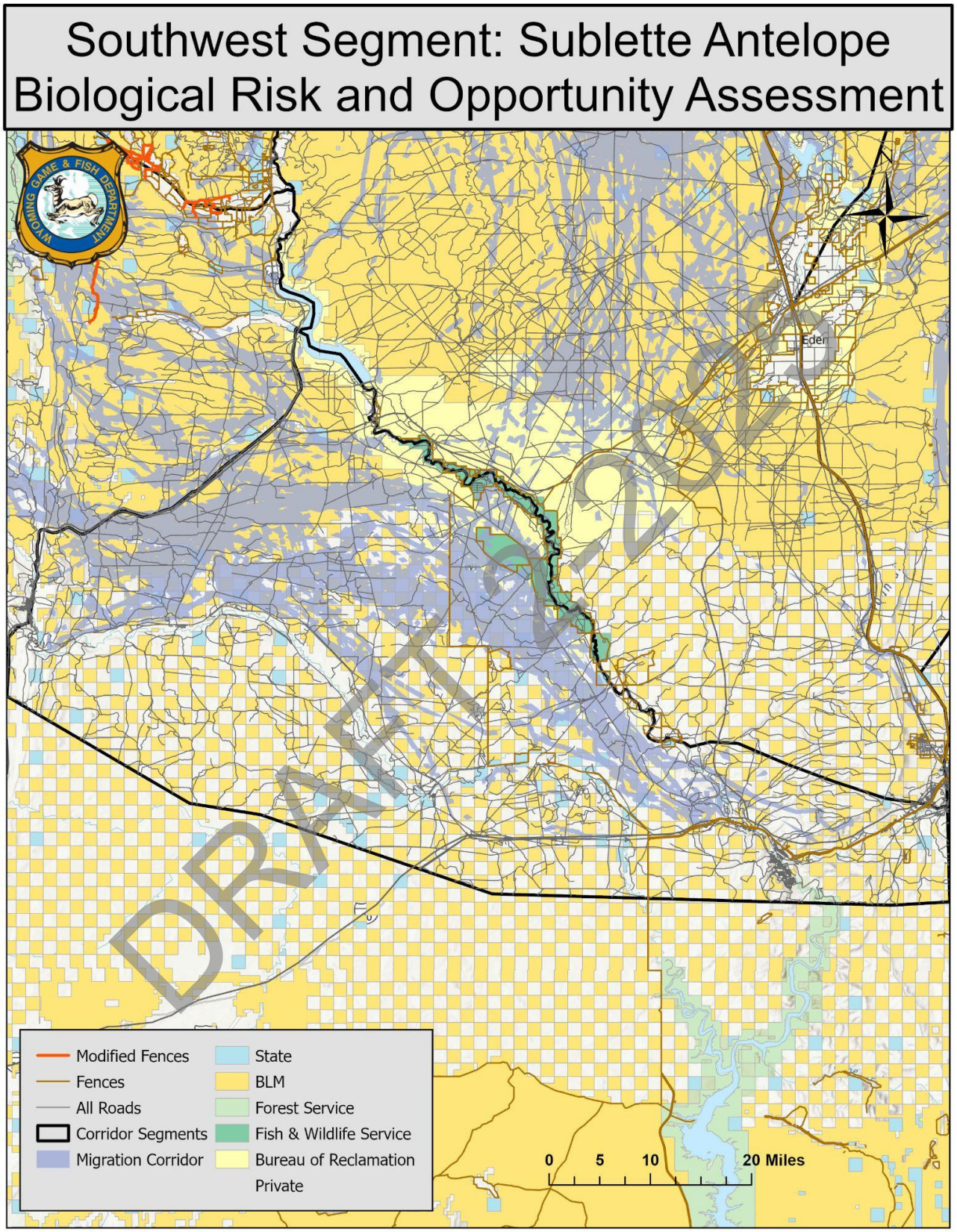

Figure 43. Southwest Segment with roads and fences.

EAST OF FARSON SEGMENT

General Description and Habitat Characteristics

Habitat used by antelope in this segment is dominated by rolling sagebrush foothills and grasslands near major drainages in valley bottoms where antelope spend time during spring, summer, and fall. Several creeks drain into the Big Sandy and Sweetwater rivers. Crucial Winter Range is located in the southern portion of this segment near the town of Farson and south into the Killpecker Sand Dunes. In addition to migratory antelope, there are year-long resident antelope within this segment. See Table 21 for a breakdown of landownership within this segment.

Table 21. East of Farson Segment land ownership.

Land Ownership	High Use Acres	Med Use Acres	Low Use Acres	Stopover Acres	Bottlenecks
BLM	0	13,447	103,023	18,754	0
USFS	0	0	0	0	0
OSLI	0	372	5,291	1,741	0
Private	0	20	1,826	905	0
WGFC	0	0	0	0	0
Other	0	0	269	0	0
Totals	0	13,839	110,409	21,400	0

Land Uses

This segment has varying land uses. There is some oil and gas development, although it is currently dispersed and has minimal impact on this landscape. Varying agricultural practices occur throughout the segment from irrigated production around Farson-Eden and livestock grazing throughout. Other uses include motorized and non-motorized recreation. These activities increase with certain seasons, such as big and small game hunting seasons. Shed antler hunting seasons have also increased recreational use of this area. Portions of this segment overlap with BLM Wilderness Study Areas (WSA) because they may contain wilderness characteristics. Motorized vehicle travel is prohibited in WSAs. See Figure 44 for a more detailed map of this segment as well as Table 22 and Figure 45 for an overview of the crucial ranges and public land areas that overlap this segment.

Table 22. East of Farson Segment crucial range and public land areas overlap.

EAST OF FARSON	Stopover Areas	Medium Use	Low Use
Big Game Crucial Range	10,069	6,901	61,703
BLM ACEC	1,810	1,804	8,903
WSA	435	1,962	7,829
Sage Grouse Core Area	20,977	13,473	108,116
BLM No Lease	640	2,196	9,855
BLM NSO	709	355	4,847

Threats and Current or Anticipated Risks

Habitat fragmentation: Wyoming Highway 28 is a paved, two-lane highway with four-strand ROW fences on the north and south sides of the highway. For many years, this highway has been challenging for antelope to cross, particularly with deeper snow conditions. In 2020-21, WGFD, WYDOT, and NGO partners collaborated to modify 10 miles of the fence by changing the bottom strand to smooth wire and elevating the height to 18 inches above the ground. In addition, adjustable wire clips were installed on 18 miles of fence where the bottom wire may be moved between 16-20 inches and seven double-paired gates were installed that are opened seasonally to facilitate movement of antelope and mule deer. In spite of these efforts, this highway continues to be a challenge for connectivity in this segment. This segment also has experienced an increase in the popularity of ORV use. Mining and energy development are not common in this segment (see Figure 46).

Habitat quality: Low precipitation makes this area vulnerable to damage from excessive herbivory, particularly from feral horses. Shrub communities are old and heavily hedged which provide reduced forage value potential for antelope. When these communities are in good condition, annual shrub leader production and early vegetative green-up benefit antelope during transitional seasons.

Cheatgrass and weed invasion: In portions of this area, cheatgrass has started to become established and invasive annual grasses should be monitored and treated before increased spread occurs. In particular, the Prospect Mountains have been a priority for cheatgrass control efforts for several years, and will continue to be treated to minimize spread of cheatgrass and enhance mixed mountain shrub communities.

Conservation Opportunities to Mitigate Threats, Including Known Limitations

Habitat fragmentation: This segment's landscape is largely unaltered and serves as high-quality habitat for many species including antelope. Fences are minimal and most roads are only seasonally accessible (see Figure 47). An important mitigation tool is collaboration among project proponents, WGFD, and BLM to locate any potential future development outside of high-use areas, stopover habitat and bottlenecks. Current fence crossing structures on Wyoming Highway 28 should also continue to be opened seasonally to ensure current improved connectivity is maintained. Extensive opportunities exist to implement voluntary conservation practices on private land such as CEs and habitat leasing through the Grassland CRP program. Funding opportunities are at an all-time high, particularly due to the USDA Migratory Big Game Initiative, but available funding still limits the number of projects that are implemented annually.

Habitat quality: Although few vegetation treatments have been completed to improve sagebrush, bitterbrush or mixed mountain shrub habitat, opportunities to enhance stand health may benefit antelope wintering in and migrating through this segment. Bitterbrush is a particularly important browse for antelope year-round. However, this area has experienced significant tent caterpillar infestations over the last five years which has impacted shrub health, and limits opportunities for shrub treatments. Coupled with drought, these infestations have increased the amount of decadent bitterbrush across the area. Goals of vegetation treatments should be to restore and sustain a diverse age structure and maintain or reduce browse levels. Wet meadow enhancement projects are underway in this area utilizing simple hand-built rock structures to reduce erosion, increase soil moisture, and expand on mesic plant communities. These wet meadow habitats represent a small fraction of the landscape, but are disproportionately important to wildlife especially during low moisture years.

Cheatgrass and weed invasion: Cheatgrass is currently being managed in this segment and there will continue to be opportunities for invasive species treatments into the future.

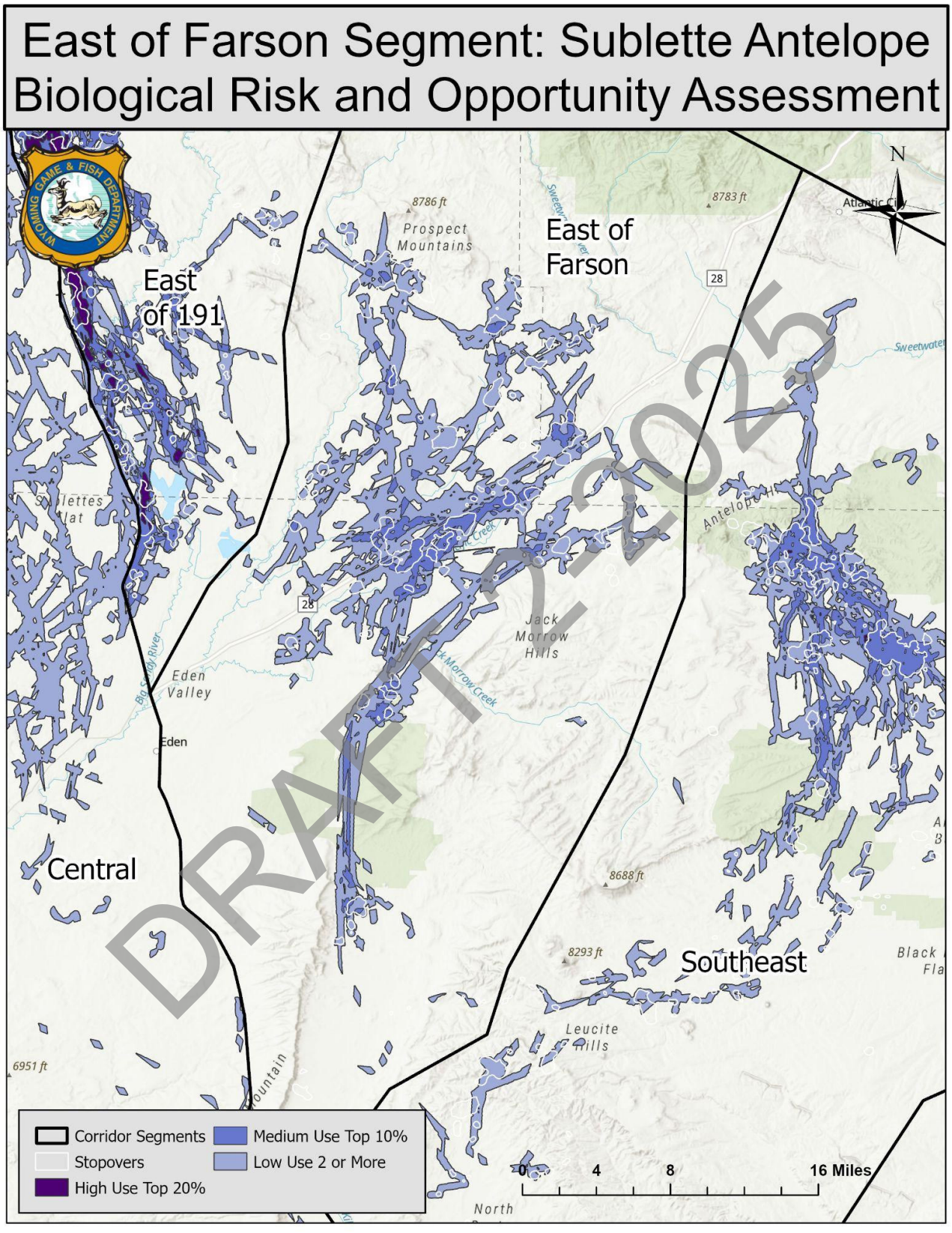

Figure 44. East of Farson Segment with use levels and stopovers.

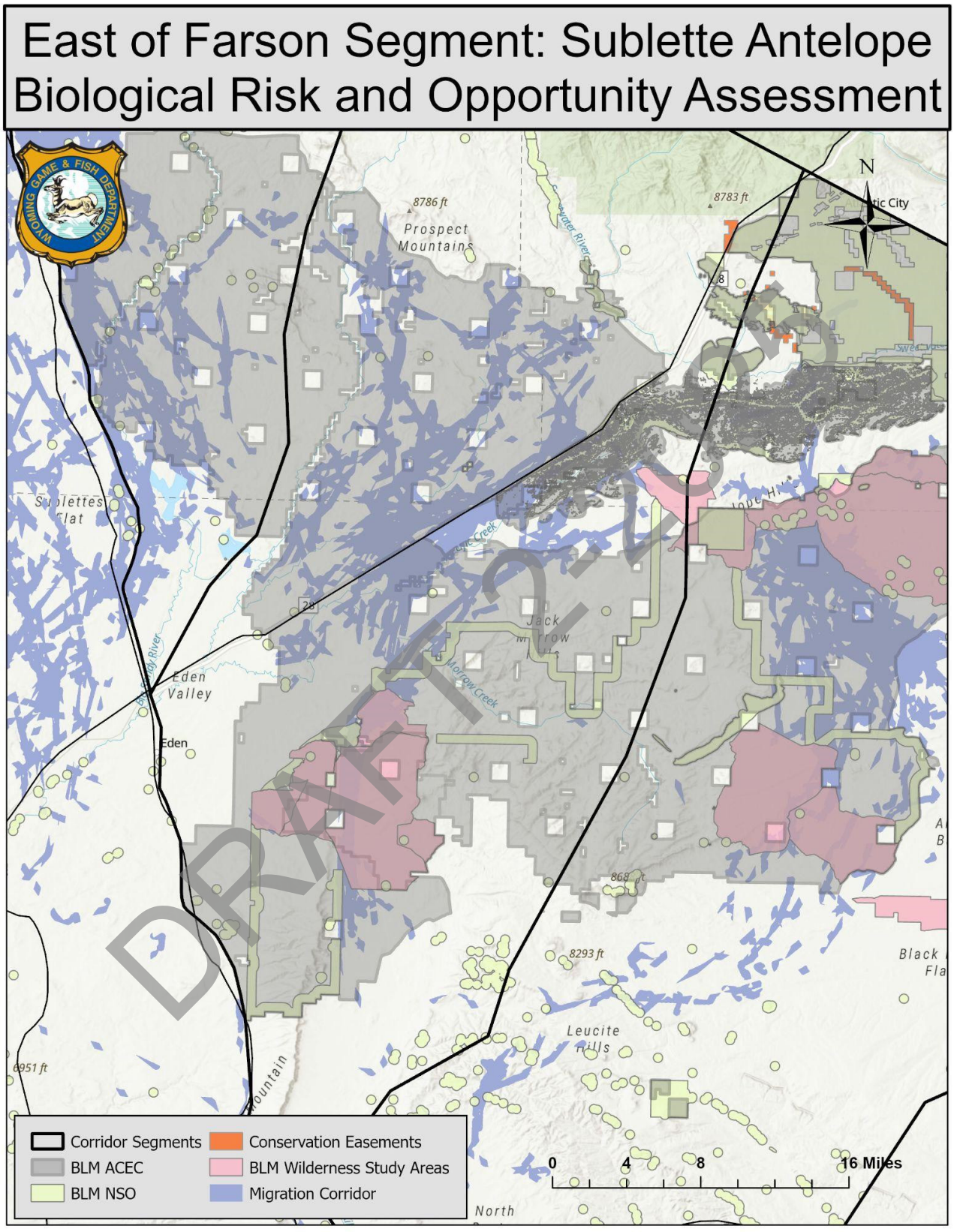

Figure 45. East of Farson Segment with CEs and federal protections.

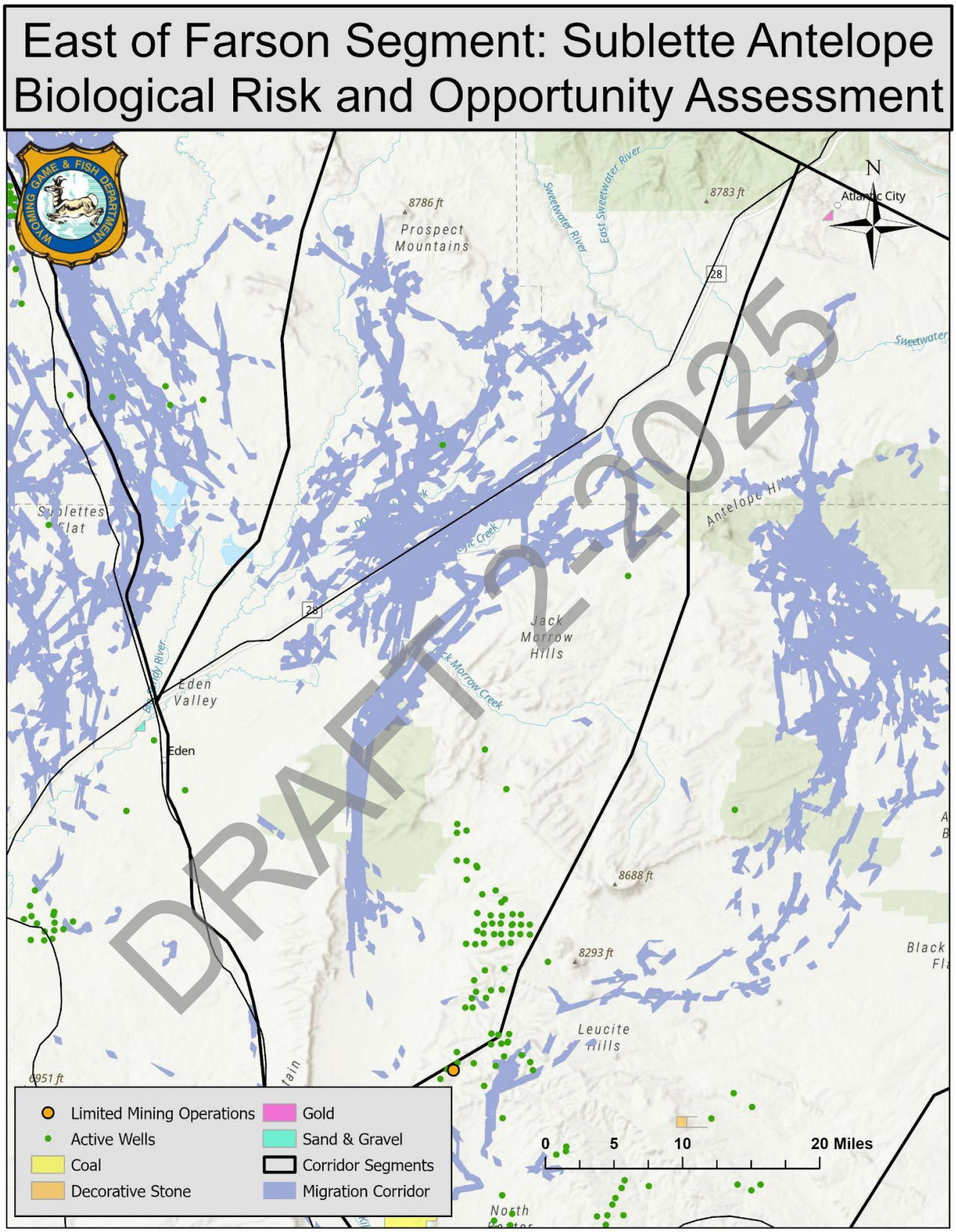

Figure 46. East of Farson Segment energy and mining development.

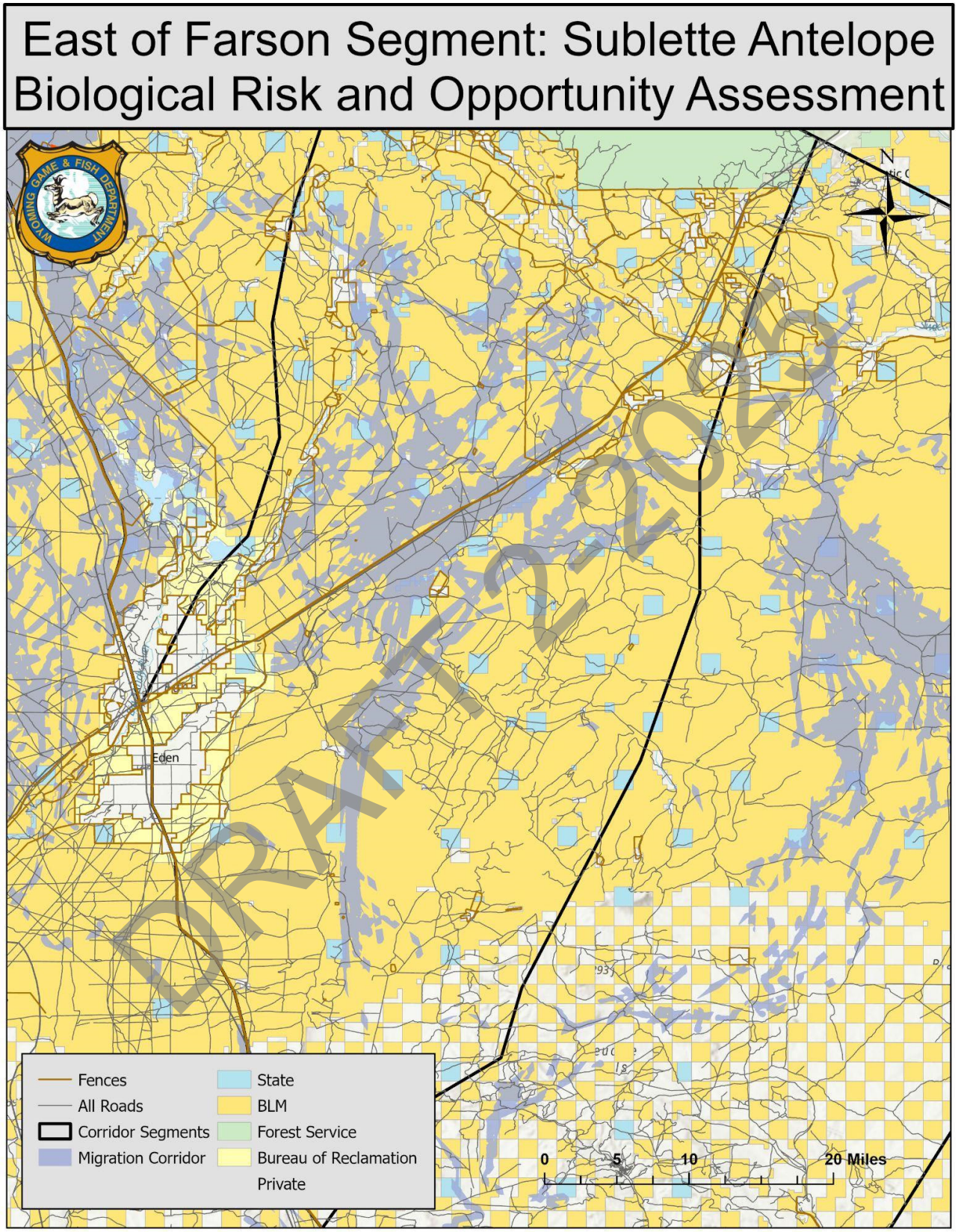

Figure 47. East of Farson Segment with roads and fences.

RED DESERT SEGMENT

General Description and Habitat Characteristics

The Red Desert Segment encompasses mostly high-elevation desert habitats (approximately 6,500-7,500 feet) that consist primarily of Wyoming big sagebrush, with many other sagebrush species being present, as well as salt desert shrubs. Draws and drainages are typically greasewood dominated. Many geological features exist creating unique and rough topography in places. Also bisecting this segment is a living sand dune complex that starts near Eden and stretches approximately 70 miles to the east. In general, this segment extends from the north around Oregon Buttes and Honeycomb Buttes to winter ranges to the south around North Baxter Basin northeast of Rock Springs. This segment contains winter range used by long-distance migrants in this herd and is largely intact and functioning. See Table 23 for a breakdown of landownership within this segment.

Table 23. Red Desert Segment land ownership.

Land Ownership	High Use Acres	Med Use Acres	Low Use Acres	Stopover Acres	Bottlenecks
BLM	73	16,087	74,963	15,905	0
USFS	0	0	0	0	0
OSLI	0	1,558	5,049	1,495	0
Private	0	7	8,810	2,576	0
WGFC	0	0	0	0	0
Other	0	0	16	0	0
Totals	73	17,652	88,838	19,976	0

Land Uses

Land use within this segment includes seasonal livestock grazing throughout. Oil and gas development exists, but is currently dispersed and has minimal impact on this landscape. Coal mining infrastructure exists in the southern portion, but current and potential development have minimal impact. Other uses include motorized and non-motorized recreation. These activities increase with certain seasons, such as big and small game hunting seasons. Shed antler hunting seasons have increased recreational use of this area. Portions of this segment overlap with several BLM WSAs with motorized travel being prohibited. See Figure 48 for a more detailed map of this segment as well as Table 24 and Figure 49 for an overview of the crucial ranges and public land areas that overlap this segment.

Table 24. Red Desert Segment crucial range and public land areas overlap.

RED DESERT	Stopover Areas	Medium Use	Low Use
Big Game Crucial Range	4,474	1,235	21,284
BLM ACEC	237	0	4,238
WSA	2,743	2,184	11,142
Sage Grouse Core Area	5,300	993	22,096
BLM No Lease	3,213	2,858	19,760
BLM NSO	642	684	7,520

Threats and Current or Anticipated Risks

Habitat fragmentation: Mining and energy development are not common in this segment (see Figure 50). Popularity of ORV use has increased and could present risks of seasonal disturbance and habitat degradation due to widespread access to two track roads (see Figure 51). Potential for renewable energy development exists with construction of Gateway West transmission lines, which would create reasonable access to distribute generated power. There is a barrier created by woven wire fences in the northern end of the Red Desert Segment and south of the Sweetwater River.

Although it technically does not intersect the Corridor, Interstate 80 is the southern boundary of the segment and essentially functions as an impermeable barrier to antelope movement (Kauffman et al. 2018). During severe winters, antelope tend to continue moving south until they encounter Interstate 80. While managers are not aware of any antelope movement data prior to construction of the interstate, it is probable antelope historically migrated further south, especially during severe winters which has potential to reduce mortality rates.

Cheatgrass and weed invasion: Cheatgrass has become established in portions of this area and should be monitored and treated to prevent spread.

Habitat quality: Low precipitation makes this area vulnerable to damage from excessive herbivory, particularly from feral horses.

Conservation Opportunities to Mitigate Threats, Including Known Limitations

Habitat fragmentation: Fencing is present throughout portions of the segment and modifications could improve permeability. Portions of this segment extend into checkerboard land ownership creating opportunities to work with private landowners on habitat improvements and fence modifications. On the easternmost portion of the segment, WGFD is working with a landowner on a plan for fence modifications on private and BLM land which would mitigate the current risk of access to important seasonal habitat created by woven wire fences. The work has resulted in 23 miles of fence conversion to wildlife friendly specifications, with a plan to complete work by 2026.

Cheatgrass and weed invasion: Some cheatgrass control treatments have been proposed for mixed public and private land ownership. However, access can be challenging to acquire for key portions of private land in a checkerboard land ownership for inventorying cheatgrass locations, pre and post treatment monitoring, and treatment implementation.

Habitat quality: Potential for habitat improvement exists that fall within the scope of the BLM's management. This landscape contains limited resources, especially water, and the presence of feral horses places additional stress on this landscape, particularly when numbers exceed appropriate management levels. In order to address the threat feral horses pose to antelope habitat, WGFD will continue to encourage the BLM to manage horse populations at levels that do not have a negative impact on wildlife.

Based on past collar studies, this segment is missing known antelope movements across the Oregon Buttes Road that could link the Red Desert Segment with the East of Farson Segment. These movements occur between Hunt Areas 107 and 92 during migration and throughout the summer. Additionally, similar movements have been observed northwest of Wyoming Highway 28 with antelope that move back and forth across the Sweetwater River and County Road 132 (Lander Cutoff Road) between Hunt Area 107 and 91. Future collaring efforts could target this area to better document these movements.

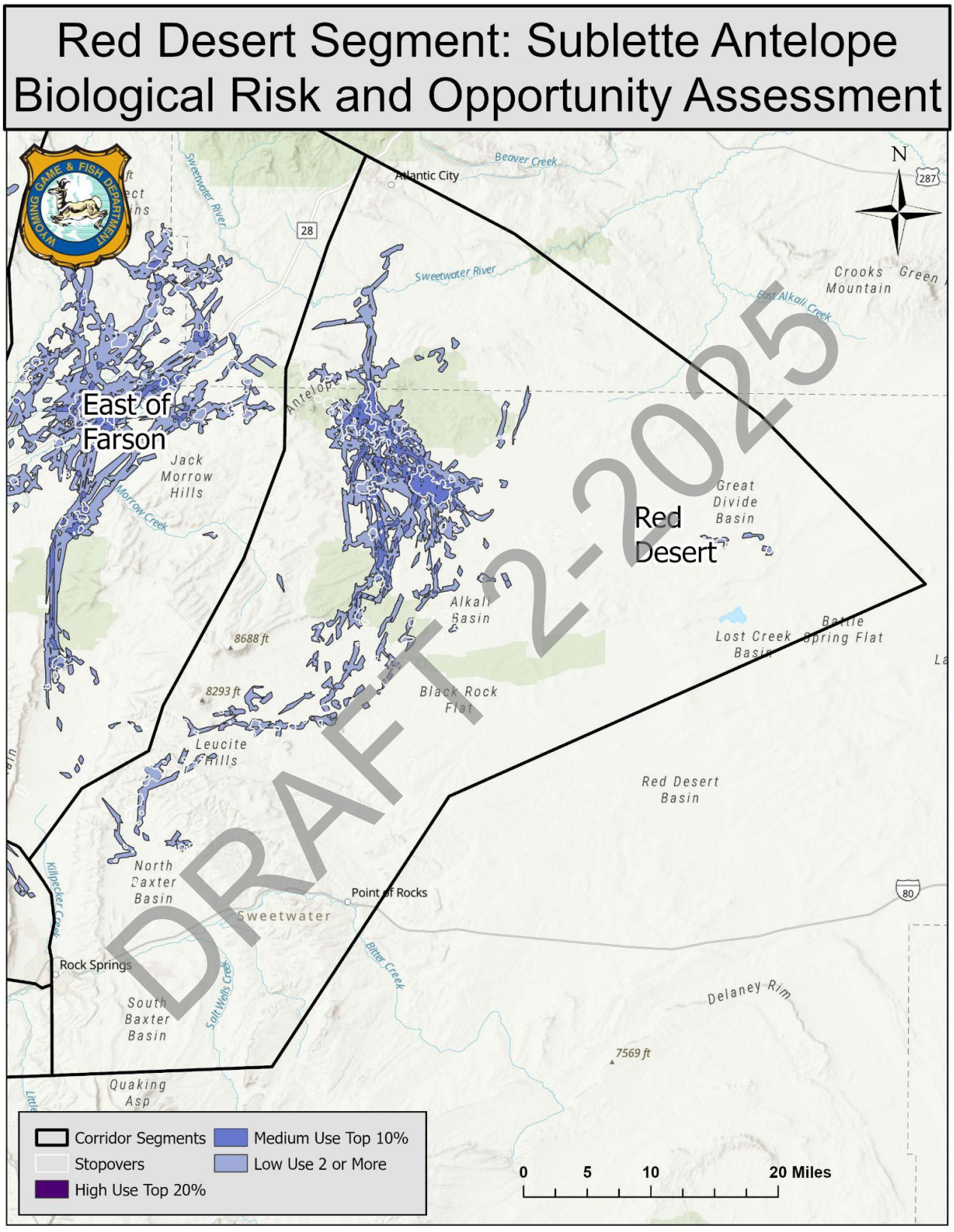

Figure 48. Red Desert Segment land ownership and stopovers.

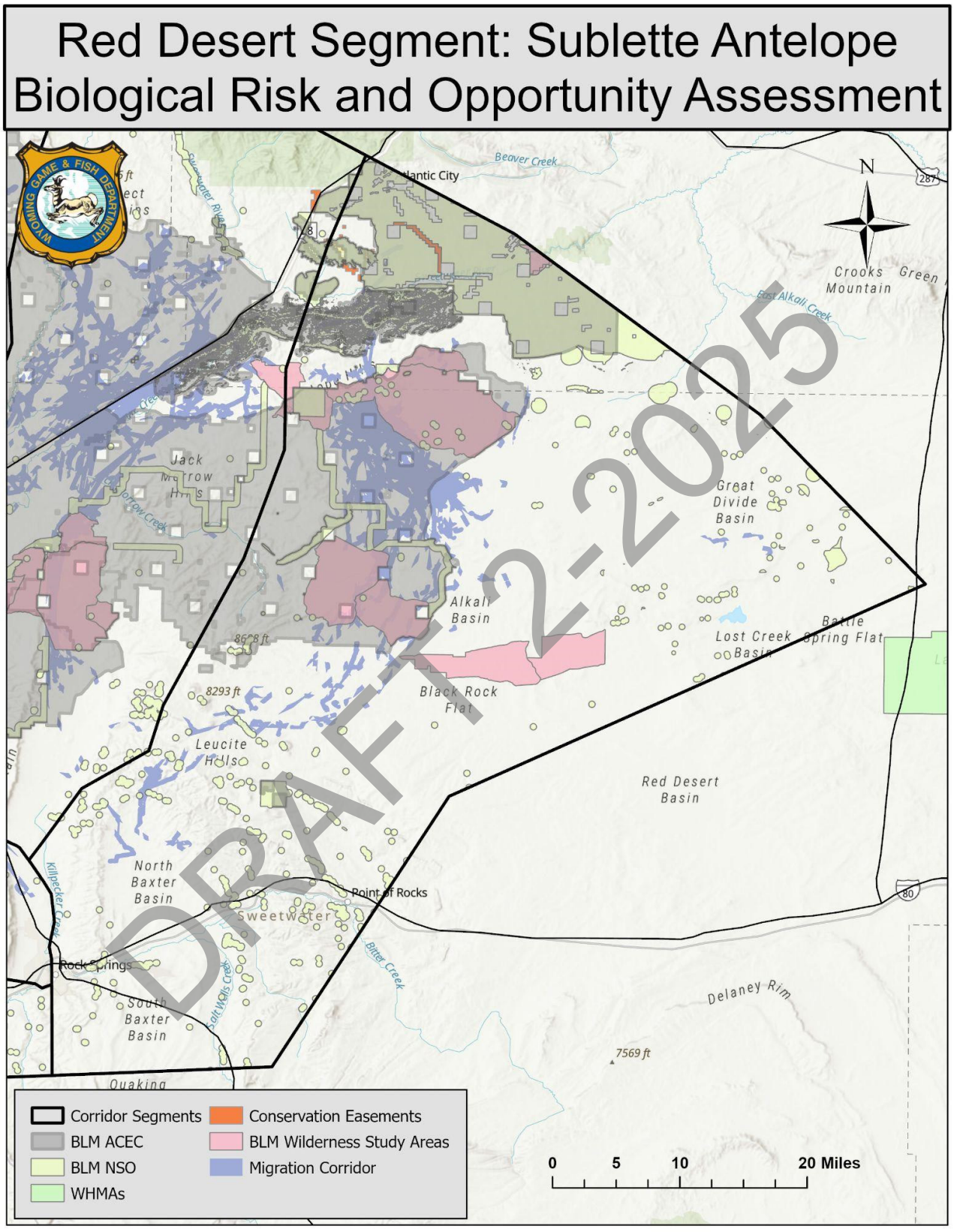

Figure 49. Red Desert Segment with CEs and federal protections.

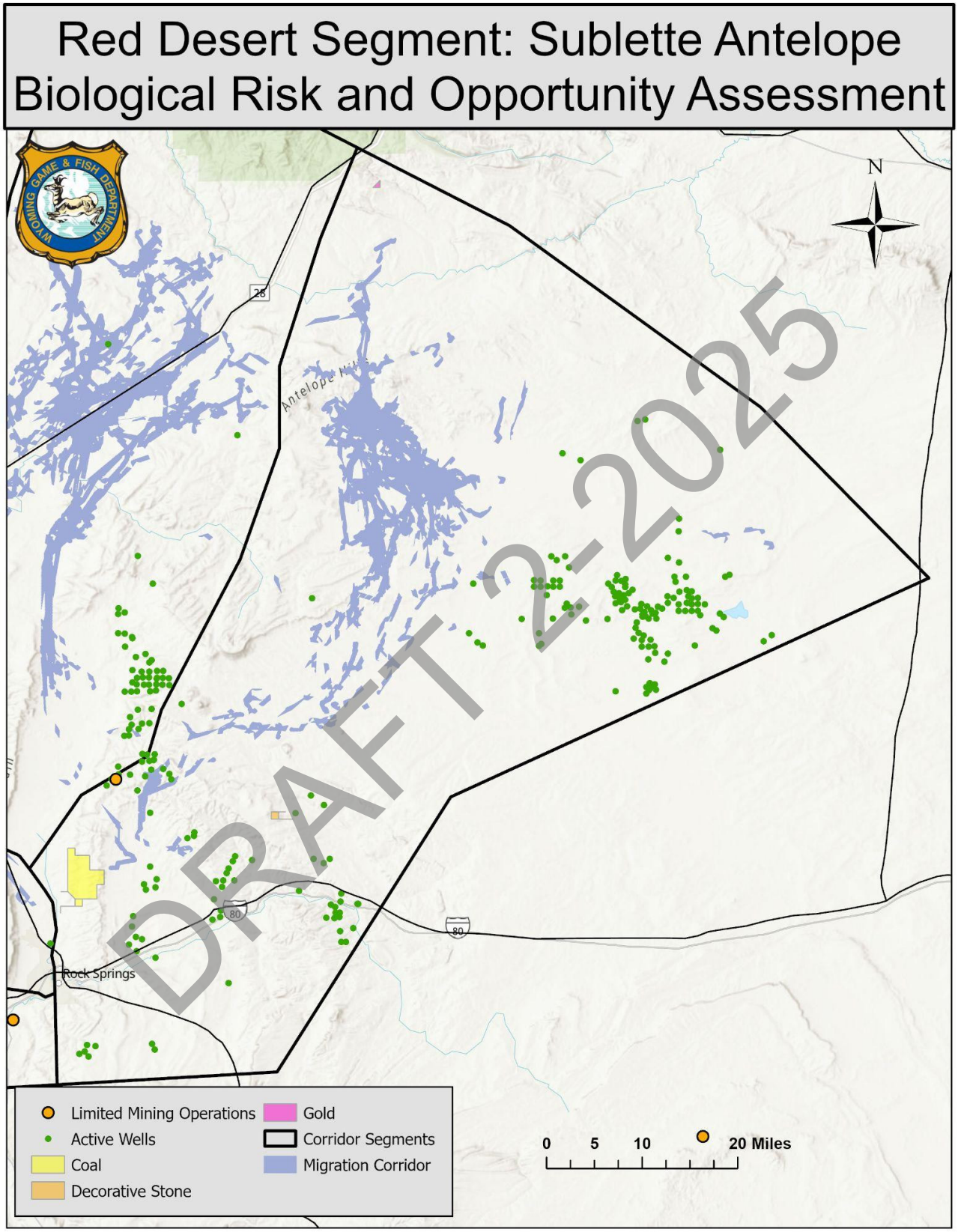

Figure 50. Red Desert Segment energy and mining development.

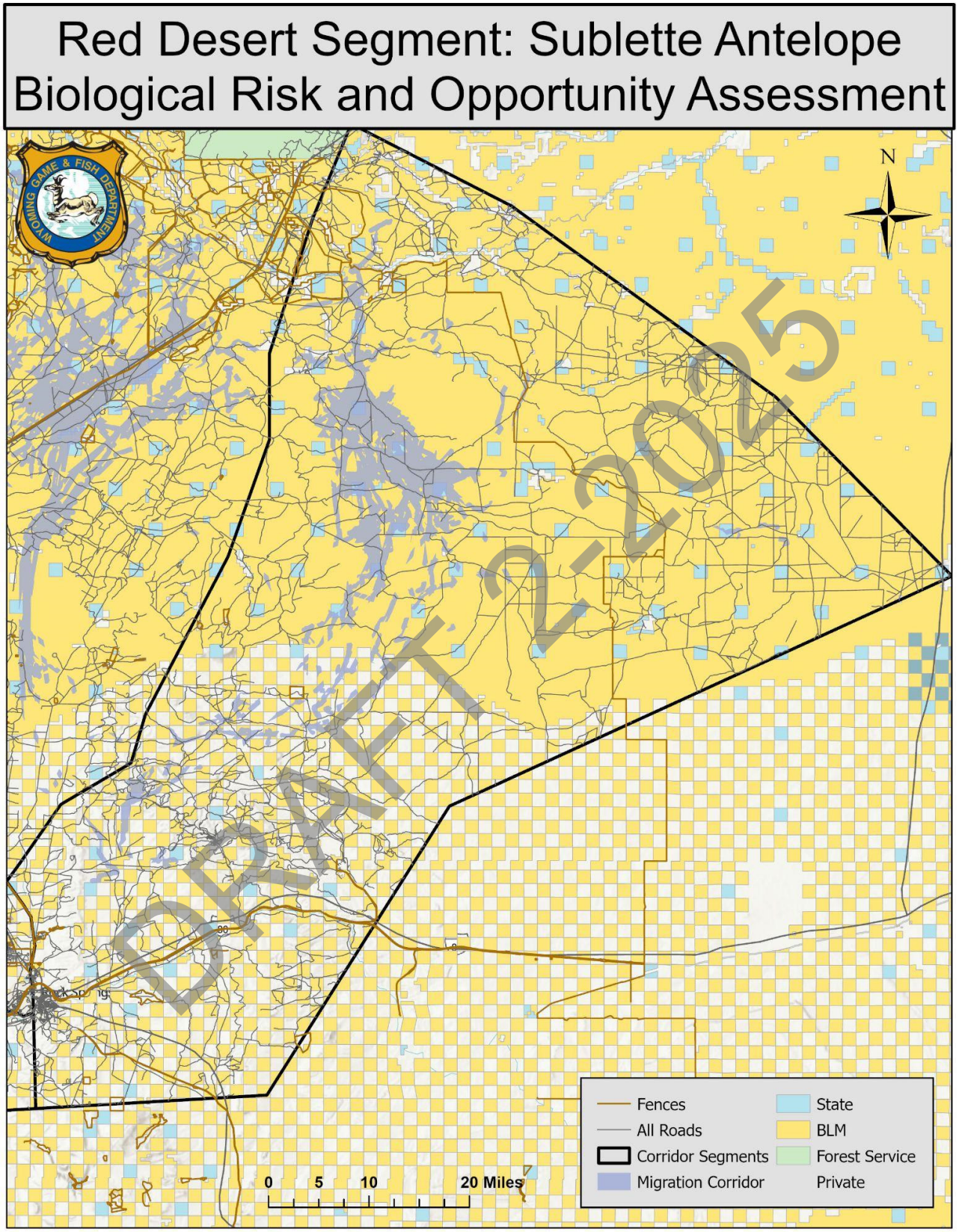

Figure 51. Red Desert Segment with roads and fences.

SUMMARY OF TOP THREATS AND ASSOCIATED CONSERVATION OPPORTUNITIES

Habitat Fragmentation:

1. **Residential subdivisions:** Residential subdivisions fragment wildlife habitats and result in increased human presence, fencing, and road development, all of which can affect wildlife and habitat functionality on a year-round basis. Land development regulations and zoning decisions regarding residential subdivisions are critical to mitigate one of the most significant threats in the north half of the Corridor. WGFD will continue to assist local governments in their decision making by assessing project-level impacts to wildlife, providing wildlife use information, and where appropriate, making recommendations on how to avoid or minimize impacts.
2. **Industrial development:** Renewable energy including solar and wind developments, as well as carbon sequestration activities, are some of the most significant threats within the southern half of the Corridor. Other developments such as those from oil and gas are additional disturbances that can contribute to fragmentation of the corridor. Working with developers on placement of infrastructure outside of bottlenecks, high-use areas, and stopovers is the priority to mitigate this threat and maintain functionality of this corridor.
3. **Mining:** Infrastructure associated with mining operations (trona/gravel) is an immediate and ongoing threat in the Southwest Segment. Working with developers on placement of mining infrastructure outside of bottlenecks, high-use areas, and stopovers is the priority for maintaining functionality of this corridor.

Fences:

Woven-wire fences and other impermeable fence designs are a barrier to antelope connectivity throughout the Corridor. Fence modification and removal projects are underway with significant momentum to make additional improvements in the middle and southwest parts of the Corridor. In many places these projects are very popular and considered win-win for landowners and wildlife managers, although resources for inventory and project implementation remain limited. Therefore, additional funding and capacity to manage these projects needs to be addressed in order to continue and expand these efforts.

Restricted bottlenecks:

The New Fork and Green River bottlenecks are pinch points with very specific and narrow locations that antelope select to cross within the riparian areas. These are threatened by development within and adjacent to the known crossing locations. Maintaining connectivity will rely upon partnerships to manage these areas in a way that ensures Corridor functionality.

Feral horse management:

On the southern end of the Corridor feral horse presence and management is an ongoing threat. Rangeland health suffers when horse populations exceed habitat carrying capacity. Competition for resources in these arid habitats is detrimental to the forage needs of antelope. The WGFD does not have management authority over feral horses, but encourages the BLM to maintain horse populations at levels that support the habitat needs of wildlife.

Conclusion

Habitat fragmentation associated with rural residential development and energy and mineral extraction are the most significant threats to the continued functionality of the Corridor (Table 25). Development can continue to occur within this landscape by minimizing impacts to migratory antelope and the habitats they rely on. Continued close collaboration in designing development projects in the least impactful way as a result of Corridor designation will result in win-win situations for Wyoming. Locating surface disturbance outside of high-use areas, stopover habitats, and bottlenecks (Table 26) allows for multiple uses of the landscape while ensuring the long-term conservation of the Sublette Antelope Corridor. Designating this Corridor empowers companies and local governments to proactively use science and data to make decisions that accommodate a variety of uses on the landscape while protecting the most sensitive areas of the Corridor.

The additional threats to the functionality of the corridor, as identified in this Assessment — including impermeable fences, restricted bottlenecks, invasive species, feral horse management, and recreation — are significant and cannot be overlooked. Addressing habitat fragmentation without concurrently addressing these additional threats will not be sufficient to ensure long-term functionality of the Corridor. While existing conservation protections and practices are currently in place, they alone are inadequate to fully mitigate the challenges facing this Corridor. Corridor designation would prioritize actions to address these pressing issues, and would help focus resources to ensure that conservation efforts are adequately supported and sustained over the long term.

Landownership within the Corridor extends across a wide variety of management entities with various goals and mandates for land management actions. By implementing the Migration EO, one consistent, science-based strategy will guide management of this Corridor under the guidance of the State of Wyoming. The WGFD recommends designation of the Sublette Antelope Migration Corridor under the authority of the Migration EO to further support antelope conservation and multiple use of this important landscape.

Table 25. Threats and conservation actions for each segment, part 1 of 2.

Segment	Threat	Conservation action to mitigate threat
North	Motorized and non-motorized recreation	Public land travel management*
		Seasonal road and trail closures*
	Habitat fragmentation	Locating disturbance out of high use and stopover areas*
		Minimize new fences, trails and roads in high use and stopovers*
		Conservation easements
		Remove/modify existing fences
		Local government planning and zoning
	Cheatgrass and weed invasion	Mapping weeds then herbicide application
	Habitat quality	Enhance native sagebrush communities
Bondurant	Habitat fragmentation	Locating disturbance out of high use and stopover areas*
		Minimize new fences, trails and roads in high use and stopovers*
		Conservation easements
		Remove/modify existing fences
		Local government planning and zoning
	Habitat quality	Vegetation management to reduce conifers
Foothills	Residential development	Local government planning and zoning
		Conservation easements
	Habitat fragmentation	Locating disturbance out of high use and stopover areas*
		Minimize new fences, trails and roads in high use and stopovers*
		Remove/modify existing fences
	Cheatgrass and weed invasion	Herbicide application
	Habitat quality	Enhance native sagebrush communities
East of 191	Residential development	Local government planning and zoning
		Conservation easements
	Habitat fragmentation	Locating disturbance out of high use and stopover areas*
		Minimize new fences, trails and roads in high use and stopovers*
		Remove/modify existing fences
	Cheatgrass and weed invasion	Herbicide application
	Habitat quality	Enhance native sagebrush communities
Central	Habitat fragmentation	Locating disturbance out of high use and stopover areas*
		Minimize new fences, trails and roads in high use and stopovers*
		Remove/modify existing fences
	Residential development	Local government planning and zoning
		Conservation easements
	Cheatgrass and weed invasion	Herbicide application
Calpet	Habitat fragmentation	Locating disturbance out of high use and stopover areas*
		Minimize new fences, trails and roads in high use and stopovers*
		Remove/modify existing fences
	Residential development	Local government planning and zoning
		Conservation easements
	Cheatgrass and weed invasion	Herbicide application
Fontenelle	Habitat fragmentation	Locating disturbance out of high use and stopover areas*
		Minimize new fences, trails and roads in high use and stopovers*
		Remove/modify existing fences
	Cheatgrass and weed invasion	Herbicide application
Southwest	Habitat fragmentation	Locating disturbance out of high use and stopover areas*
		Minimize new fences, trails and roads in high use and stopovers*
		Remove/modify existing fences
	Cheatgrass and weed invasion	Herbicide application
	Habitat quality	Enhance native sagebrush communities

** Denotes actions that would be directly influenced by designation through the Migration EO.*

Table 25. Threats and conservation actions for each segment, part 2 of 2.

Segment	Threat	Conservation action to mitigate threat
East of Farson	Habitat fragmentation	Locating disturbance out of high use and stopover areas*
		Minimize new fences, trails and roads in high use and stopovers*
		Remove/modify existing fences
	Cheatgrass and weed invasion	Herbicide application
	Habitat quality	Enhance native sagebrush communities
Red Desert	Habitat fragmentation	Locating disturbance out of high use and stopover areas*
		Minimize new fences, trails and roads in high use and stopovers*
		Remove/modify existing fences
	Cheatgrass and weed invasion	Herbicide application
	Habitat quality	Enhance native sagebrush communities

** Denotes actions that would be directly influenced by designation through the Migration EO.*

Table 26. Threats and conservation actions for each bottleneck.

Bottleneck	Threat	Conservation action to mitigate threat
Red Hills	Recreation	Restrict seasonal-human presence*
	Habitat fragmentation	No surface disturbance*
	Cheatgrass invasion	Herbicide application
Bacon Creek	Habitat fragmentation	No surface disturbance*
	Conifer encroachment	Vegetation mangement
	Recreation	Restrict seasonal-human presence*
	Cheatgrass and weed invasion	Herbicide application
Twin Creeks and Rim	Habitat fragmentation	No surface disturbance*
	Conifer encroachment	Vegetation management
Trappers and Daniel Overpass	Habitat fragmentation	No surface disturbance*
		Modify fences, install fence crossing structures
Kendall	Habitat fragmentation	No surface disturbance*
		Modify fences, install fence crossing structures
	Residential development	Conservation easements
Big Piney	Habitat fragmentation	No surface disturbance*
		Modify fences, install fence crossing structures
		Continue to open ROW gates seasonally
Noble Basin	Conifer encroachment	Vegetation management
	Habitat fragmentation	Minimize new fences, install fence crossing structures
New Fork and Green River	Habitat fragmentation	No surface disturbance*
		Modify fences, install fence crossing structures
	Residential development	Conservation easements
Blacks Fork	Habitat fragmentation	No surface disturbance*
		Modify fences, install fence crossing structures

** Denotes actions that would be directly influenced by designation through the Migration EO.*

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APPENDIX A: SUBLETTE ANTELOPE THREAT EVALUATION

Wyoming Game and Fish Department Migration Corridor Threat Evaluation

Sublette Pronghorn

Regional personnel made a recommendation to identify or pursue designation of the migration corridor based on the information provided in this report. Corridors that are high risk due to known threats will be moved forward in the designation process. If conditions change, this threat evaluation can be updated and the corridor's status may be changed through the process as outlined in the Migration Corridor Executive Order 2020-01.

WGFD Corridor Identification-Designation Department Recommendation: Pursue the Designation Process

Date: February 21, 2024

Range of distance collared individuals migrated: 6 to 165 miles

Longest migration distance: 165 miles

This herd is over 75% migratory

Counties that overlap the corridor: Fremont, Lincoln, Sublette, Sweetwater and Teton

Methods for data analysis: Brownian Bridge Movement Model for Stopovers and 300 m Line Buffer for High, Medium and Low Corridor footprints. Please see Appendix of Methods for more information

Number of individuals: 415

Number of Sequences: 806

Years completed: 2002 to 2022

Acreage Table: *Please fill in acres and (percent of total) within the corridor for each use level, by land ownership.*

	BLM	USFS	OSLI	WGFC	Private	Other*	Total
Low Use	1,061,879 (62%)	143,245 (8%)	70,567 (4%)	1,920 (.1%)	339,201 (20%)	96,468 (5%)	1,713,280
Medium Use	233,044 (61%)	63,629 (17%)	15,296 (4%)	1,043 (.2%)	48,442 (12%)	18,368 (5%)	379,822
High Use	60,039 (46%)	38,515 (30%)	4,243 (3%)	122 (<.1%)	20,397 (16%)	7,078 (5%)	130,394
Stopovers within High Use	42,151 (59%)	10,560 (15%)	2,688 (4%)	26 (<.1%)	11,610 (16%)	5,037 (7%)	72,071
Stopovers within Other Use	325,953 (70%)	28,487 (6%)	21,478 (5%)	723 (.1%)	70,752 (15%)	20,198 (4%)	467,592
Bottlenecks	3,014 (16%)	8,301 (43%)	633 (3%)	0 (0%)	6,477 (33%)	1,018 (5%)	19,443

**Other includes National Park Service, Bureau of Reclamation, USFWS Refuges, etc.*

Threats:

Consider existing and potential (10 years) threats and indicate Yes or No if they exist or potentially exist in the corridor. Indicating 'yes' to a potential threat would capture discussed or planned projects or proximal development affecting the corridor. Your narrative below should explain if these threats or protections exist throughout the corridor or in an area that only influences a portion of the herd.

	Existing	Future
Subdivision or suburban sprawl	Yes	Yes
Fence impacts (all fence conditions or not wildlife-friendly design)	Yes	Yes
Road impacts (state, county or other improved)	Yes	Yes
Oil or gas wells or APDs	Yes	Yes
Wind	No	Yes
Solar	Yes	Yes
Mining - coal, trona, bentonite, gravel	Yes	Yes
Transmission lines, compressor stations or pipelines	Yes	Yes
Other energy or resource extraction	Yes	Yes
Human recreation during migration (motorized)	No	No
Human recreation during migration (non-motorized)	No	No
Wildfire threat due to cheatgrass invasion of sagebrush ecosystem	No	Yes
Closed canopy or late succession reducing herbaceous forage	Yes	Yes
Other: habitat impacts from wild horses	Yes	Yes

Protections:

	Existing	Future
Wilderness, WSA, ACEC, SMA or NPS land	Yes	Yes
Specific county zoning protections that overlap corridor	No	No
Conservation easements	Yes	Yes
NSO, CSU, or other lease land use plans from RMPs, Forest Plans, etc	Yes	Yes
USDA habitat leases (G-CRP)	No	Yes
Projects in development to mitigate threats	Yes	Yes
Other: federally designated migration corridor, Path of the Pronghorn	Yes	Yes

Narrative: Include a description of the corridor and explain answers or justify determination. Also, please submit maps along with this application. At least one map is needed for this entire corridor showing land ownership.

The Sublette Pronghorn herd is one of the largest antelope populations in the world. Individuals migrate up to 165 miles between winter and summer ranges across private, state and federal lands. The public land jurisdictions include Office of State Lands and Investments, three Bureau of Land Management (BLM) field offices, U.S. Forest Service, National Park Service and United States Fish and Wildlife Service lands in addition to Wyoming Game and Fish Commission lands. Private working lands are an important component of the land ownership, and the Wyoming Game and Fish Department (Department) has a long history of supporting multiple use along with wildlife management on these private lands. The northernmost portion of the herd hosts

antelope that summer in Grand Teton National Park, the National Elk Refuge and Jackson Hole and can winter as far south as Interstate 80 near Rock Springs. Other distinct summer ranges include the Bondurant Basin, Upper Green River Basin and Waterdog Lakes on USFS land, and sagebrush steppe habitat throughout the Upper Green River Basin in the vicinity of the communities of Pinedale, Big Piney, Kemmerer, Farson, Green River and Rock Springs. Pronghorn in this herd unit are comprised of several sub-herds, and over the last 20 years movement data has been collected for a wide variety of projects. Please see Appendix of Methods for more detailed information about the research data analysis.

GPS Collar Studies conducted in the Sublette Pronghorn herd that contributed to the corridor delineation

Years	Project	Objective
2002-2003	Kemmerer	Fences and roads as barriers
2003-2004	Grand Teton NP	Jackson Hole movements
2005-2010	Pinedale Anticline	Effects of natural gas development
2009-2017	Pinedale Anticline 2	Effects of natural gas development
2010-2013	Grand Teton NP 2	Jackson Hole movements
2012-2013	Jack Morrow Hills	Movement in the Red Desert
2017-2018	I-80	Influence of climate and I-80
2018-2020	Sweetwater Solar	Effects of solar energy development
2020-2024	Distribution Gaps	Fill in areas between previous studies

This is one of the most extensive and data-rich GPS collar datasets available for antelope in the world. Because of the very large and diverse landscape inhabited by Sublette antelope, various threats to and protections for maintaining functionality of the corridor have been identified and discussed below.

Threats:

There are several significant threats to maintaining the functionality of the Sublette antelope herd's seasonal movements. One of the most pressing threats is habitat loss associated with the expansion of suburban development and general expansion of the human population into native habitats. Subdivisions and associated disturbance from roads, fences, pets and humans have already affected the functionality of the corridor in some areas, and demand for more development continues to be a pressing concern. Recently, the influx of people relocating to western Wyoming has greatly increased, likely fueled by the COVID-19 pandemic and the increased ability for employees to telework away from urban centers. As of 2021, the total population of Sublette County has increased 78% since 1990 and 46% since 2000 (U.S. Census Bureau 2021). Demand for additional residential development and changes to county zoning to accommodate this demand has occurred throughout the corridor. While private land is not the dominant land ownership throughout the corridor, the impacts associated with this population expansion are predominantly focused in these areas. Development can disrupt migratory behavior and significantly impact the functionality of the corridor by animals increasing speed of movement, reducing time in stopovers or shifting use of stopovers (Wyckoff et al. 2018). The area directly west of the town of Pinedale is an example of how residential development severed a historic bottleneck. A busy roadway, numerous new buildings and impermeable fences have nearly eliminated use of this area.

Another significant threat includes energy development, both oil and gas and more recently renewable energy such as solar and wind. In the Pinedale Anticline Project Area (PAPA) adjacent to the Jonah Field, Sawyer et al. (2019) demonstrated that antelope both avoid energy infrastructure and spend considerably less time in

traditional winter ranges once habitat fragmentation occurs due to development. Additional fragmentation and active disturbance on winter and migratory habitats therefore further reduces effective available habitat and potentially compromises the herd's ability to move around during and recover after severe winters. In the LaBarge and Moxa Arch energy developments GPS collar data has only recently been collected and impacts are less understood. Planned projects (e.g., Normally Pressured Lance) will require managers to site future development in locations and during times of the year to mitigate the impacts of energy development and maintain functionality of the corridor. Disturbance thresholds associated with the sage grouse executive order in core areas would likely ensure disturbance densities do not impede migratory movements. More recently, solar energy developments have been constructed in the southern portion of the proposed corridor near Green River and along the Gateway West Transmission Line. Solar development and their associated chain link perimeter fences create a complete movement barrier to migrating antelope (Sawyer et al. 2022). It is reasonable to expect leasing on public land and the federal mineral estate to continue, even if the corridor is designated.

Additional threats to the Sublette antelope migration corridor include highways, secondary roads and fences. Vehicle collisions are a direct source of mortality, but roads also have impacts to fitness levels of individuals who are unable to efficiently cross due to right-of-way fences, snow loading or traffic volume. Also, some of the busiest stretches of road in Wyoming, such as U.S. Hwy 26-89-191 in Teton County, have or are approaching traffic levels that have functionally fragmented some habitats for this herd. Woven wire and chain link fences create complete movement barriers and significantly impact the ability of antelope to move between seasonal ranges particularly during winter. Disturbance from increased recreation such as off-road vehicles, mountain biking and antler hunting during critical times of the year may impact the functionality of the migration corridor for antelope, but there is little science or data at this time on these disturbances. Concern about recreation impacts is most likely focused in bottlenecks and will be evaluated in more detail through Biological Risk and Opportunity Assessment, if corridor designation is pursued. Lastly, there are impacts to the available forage resources from wild horses, particularly within the southern third of the corridor.

Protections:

Within the Sublette antelope herd, protections and proactive conservation measures have been implemented with a goal of maintaining the connectivity and functionality of important habitats. While the majority of land occupied by the Sublette antelope during migration is managed by the BLM, the north end of the corridor is dominated by lands managed by the USFS and GTNP with a small amount overlapping the National Elk Refuge. In 2008, the USFS designated the first federally protected migration corridor, The Path of the Pronghorn, through the Upper Green River and Gros Ventre River drainages, with a Forest Plan amendment. This act created a framework for land management decisions to be consistent with the functionality of the corridor within the mapped footprint occurring on USFS lands. In the southwest portion of the herd unit, Seedskadee National Wildlife Refuge overlaps a small portion of the corridor. Other existing land management circumstances contribute to current and long-term protections in areas that overlap the corridor, including the Gros Ventre Wilderness on USFS lands and several Wilderness Study Areas managed by the BLM.

Additional wildlife seasonal ranges provide some level of seasonal disturbance protections for portions of the herd. Pronghorn crucial winter ranges (39,682 acres) afford some protection on the high use portions of the corridor in the context of land use decisions on public land from November 15 to April 30. There is overlap between the antelope migration corridor and crucial winter range in the central and southern portions of the herd as well as overlap with mule deer crucial winter range on the Mesa and Ryegrass, between Big Piney and

Kemmerer and in the Golden Triangle areas. The Sublette mule deer migration corridor has some overlap with the high use areas of the antelope migration corridor (21,386 acres) on the Mesa and areas north and west of Pinedale towards Bondurant which would have some overlap with the spring and fall seasonal use periods. Lastly, sage-grouse core area overlaps the high use areas of the antelope corridor in several places including the area north of Kemmerer, the Ryegrass, the Mesa and areas north of Rock Springs through the Golden Triangle (86,615 acres) which are currently afforded some protections through the Sage Grouse Executive Order (SGEO), particularly in areas near leks. These restrictions on disturbance and development are associated with nesting habitat from March 15-June 30 and winter habitat from December 1-March 14.

Additional wildlife protections within the Sublette Pronghorn corridor

Description	Category from WGFC Mitigation Policy	Protections
Big Game Crucial Habitat	Vital	Activities should be avoided between November 15-April 30
Sage-Grouse Core Population Areas	Vital	*Surface Occupancy* -No surface occupancy within 0.6 miles of the perimeter of occupied Greater sage-grouse leks. Seasonal Use - Activities should be avoided from March 15 to June 30 outside of the 0.6 mile perimeter of an occupied lek.
Sage-Grouse Non-Core Habitat		*Surface Occupancy* - No surface occupancy within 0.25 miles of the perimeter of occupied Greater sage-grouse leks in non-core areas. Seasonal Use - Activities should be avoided from March 15 to June 30 outside of the 0.25 mile perimeter of an occupied lek and within 2 miles from the perimeter of the occupied lek
Sage-Grouse Winter Concentration Areas		Activities should be avoided December 1 to March 14

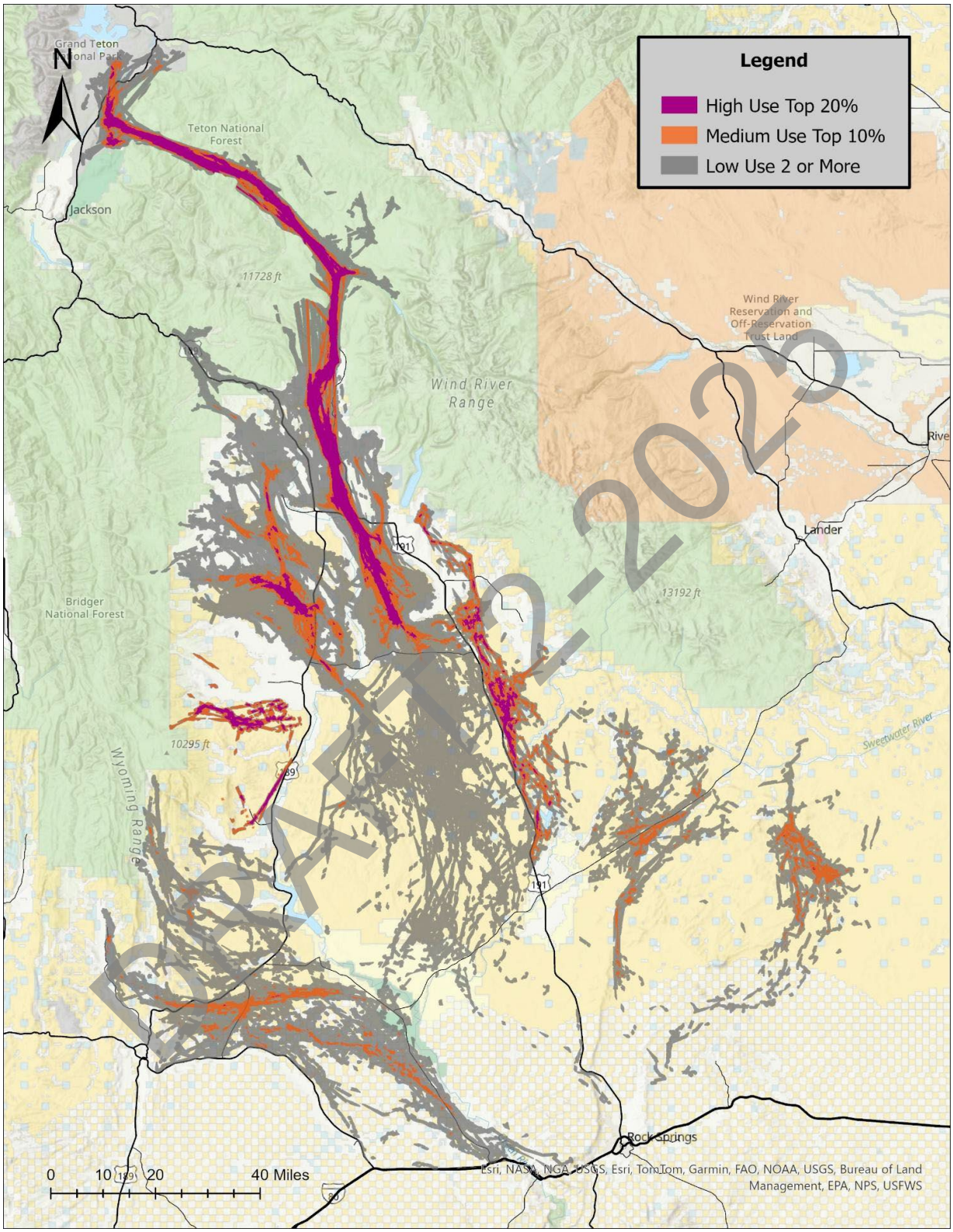
Private landowners have contributed significantly to the functionality of the corridor by voluntarily placing conservation easements on tens of thousands of acres within the corridor. Typically these deed restrictions maintain significant areas of open space indefinitely, even if the parcel is sold in the future. Also, landowners have voluntarily participated in cheatgrass and other noxious weed management efforts, implemented habitat enhancements to improve forage quality and modified hundreds of miles of wildlife friendly fence.

Many public land management efforts have also been implemented including removal of net wire fence near Kemmerer and Boulder, spraying tens of thousands of acres of cheatgrass, particularly along the west slope of the Wind River Range across all land ownerships, implementing sagebrush habitat enhancements associated with the Sublette Mule Deer and Wyoming Range Mule Deer habitat projects on BLM and a variety of mitigation projects tied to the Pinedale Anticline and Jonah gas fields. The construction of the Trappers Point highway crossing project significantly improved survival of individuals migrating across Highway 191 northwest of Pinedale through construction of two overpasses and six underpasses with associated wildlife proof fencing to funnel animals to these structures. Other highway crossing projects have been implemented on Wyoming Highways 28 near Farson, 351 south of Pinedale and 9 underpasses associated with the Dry Piney project north of LaBarge. These included the installation of paired gates to be left open during migration seasons and

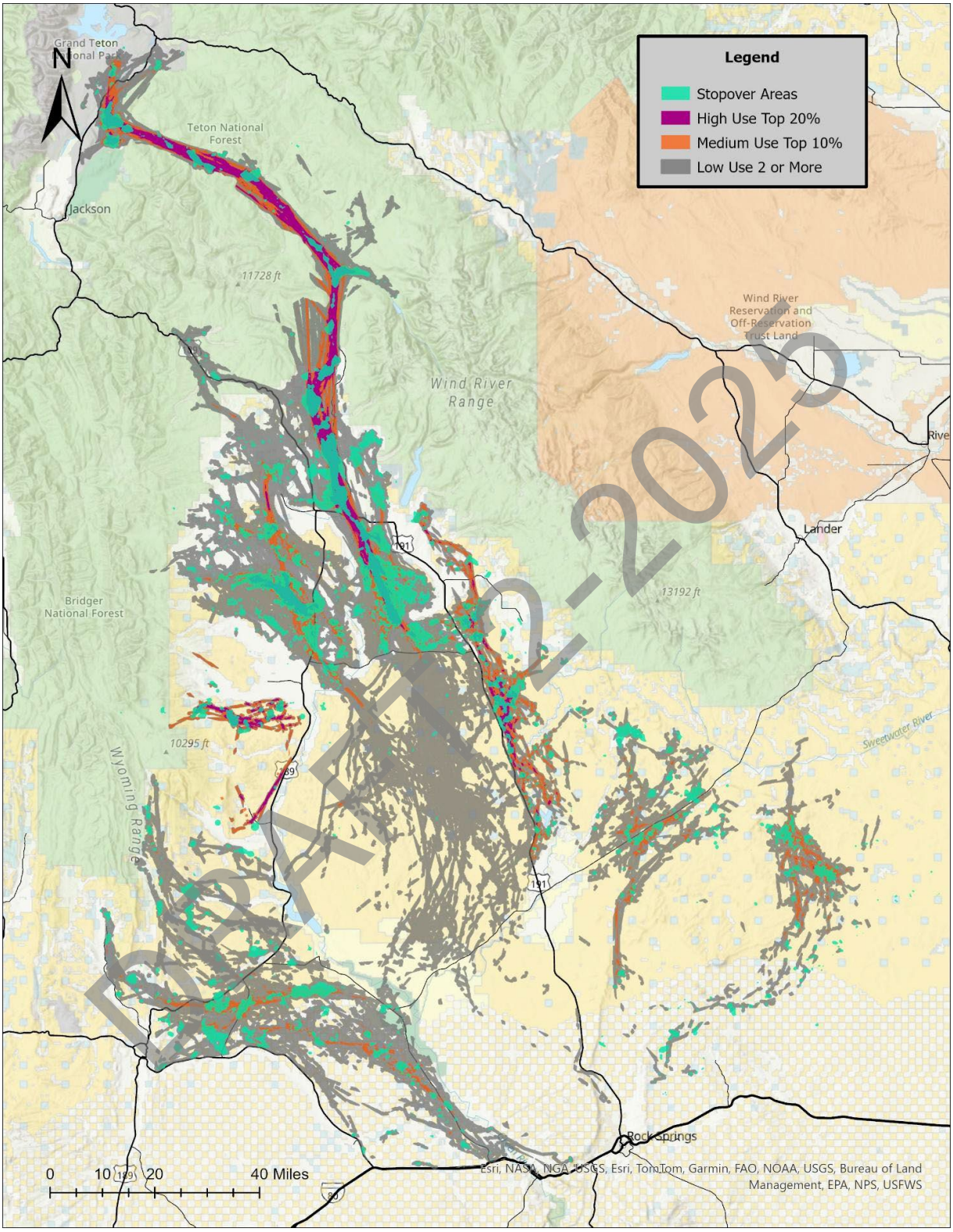
modifying the associated right-of-way fences to increase permeability and therefore access to winter ranges on either side of the roadways.

Future conservation opportunities through federal programs including the Wyoming-USDA Big Game Pilot program, federal initiatives, and willing landowners will be explored as opportunities arise. Additionally, funds have been secured to manage cheatgrass on a landscape scale, contracts are already in place for dozens of miles of fence modifications, NEPA processes are complete or nearly complete to mechanically and chemically enhance over ten thousand acres of sagebrush used by antelope within the Kemmerer and Pinedale BLM Field Offices, and several potential conservation easements are currently in various stages of planning and completion. All of these management actions have potential to positively affect and/or protect the functionality of the corridor for many years into the future.

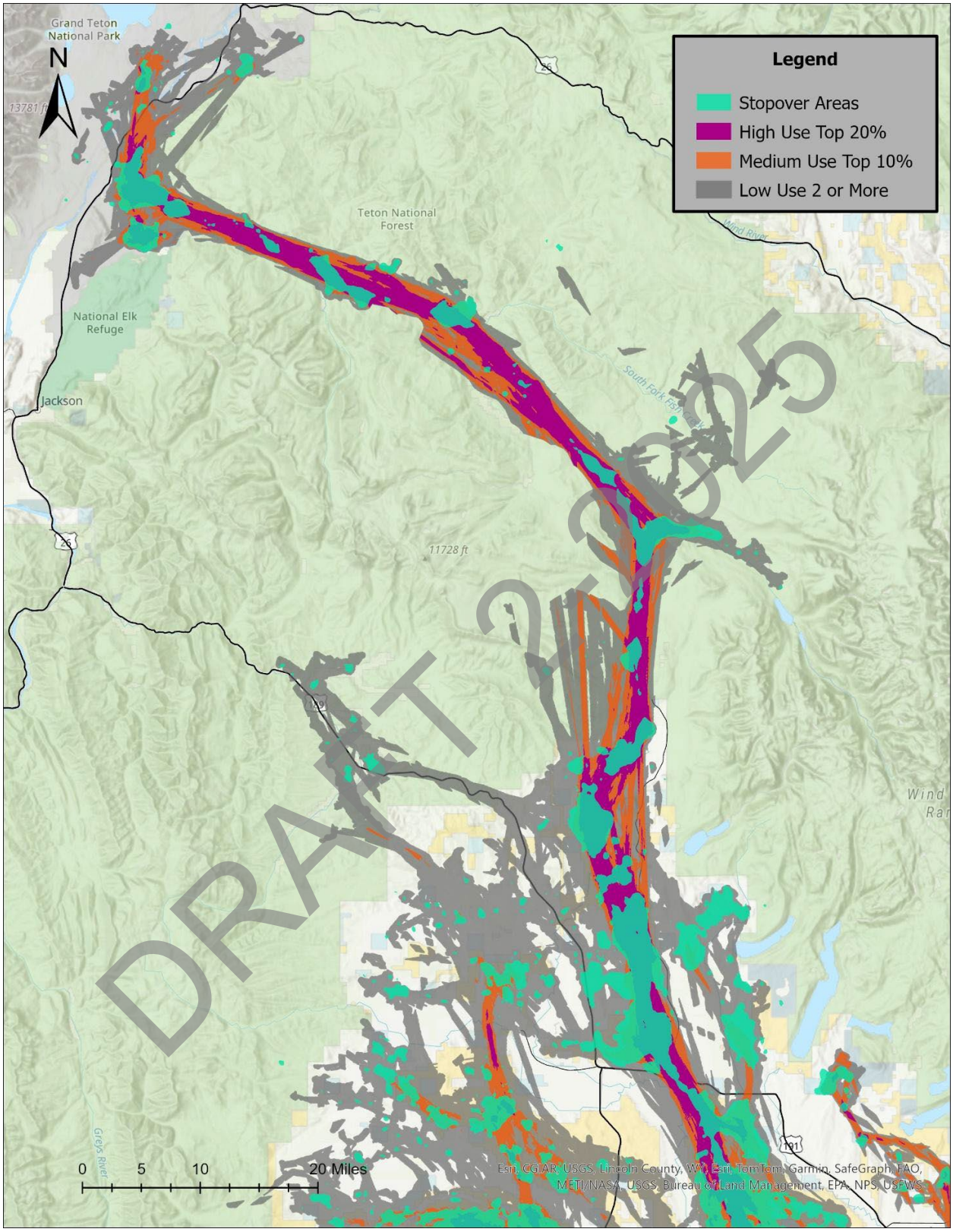
In summary, the known current and potential threats pose a high risk to the functionality of the Sublette Pronghorn migration corridor. The existing trend of suburban expansion and demand for renewable energy resources are the most concerning threats to the functionality of the corridor. In addition, the recent population reductions due to disease (*Mycoplasma bovis*) and harsh conditions during the 2022-23 winter especially highlighted the importance of permeable corridors, as animals that migrated further south generally experienced increased survival versus animals on the more northerly winter ranges. For these reasons, the Department recommends pursuing the designation process as outlined in the Wyoming Executive Order 2020-1.



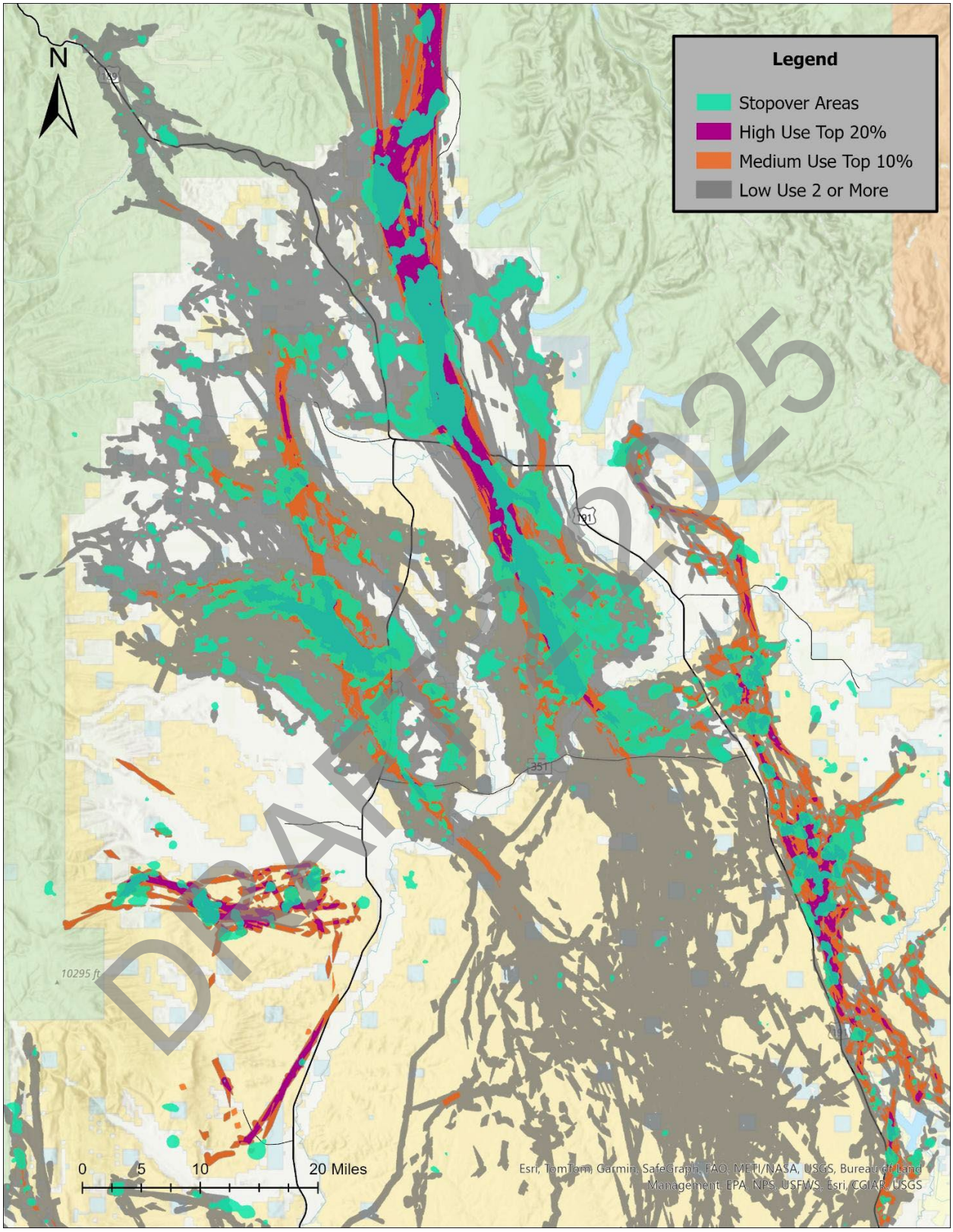
Entire Sublette Pronghorn Migration Corridor



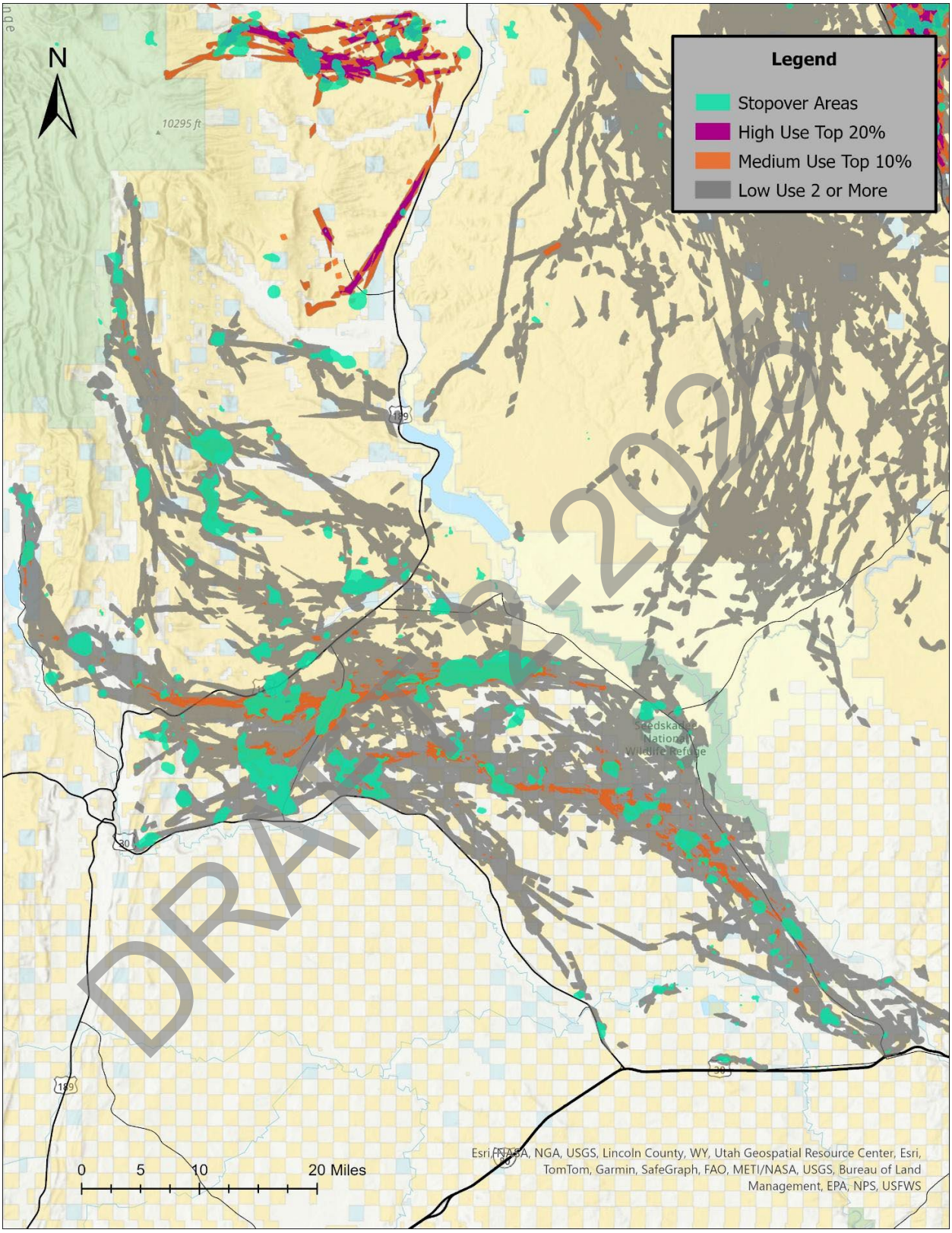
Entire Sublette Pronghorn Migration Corridor with Stopovers



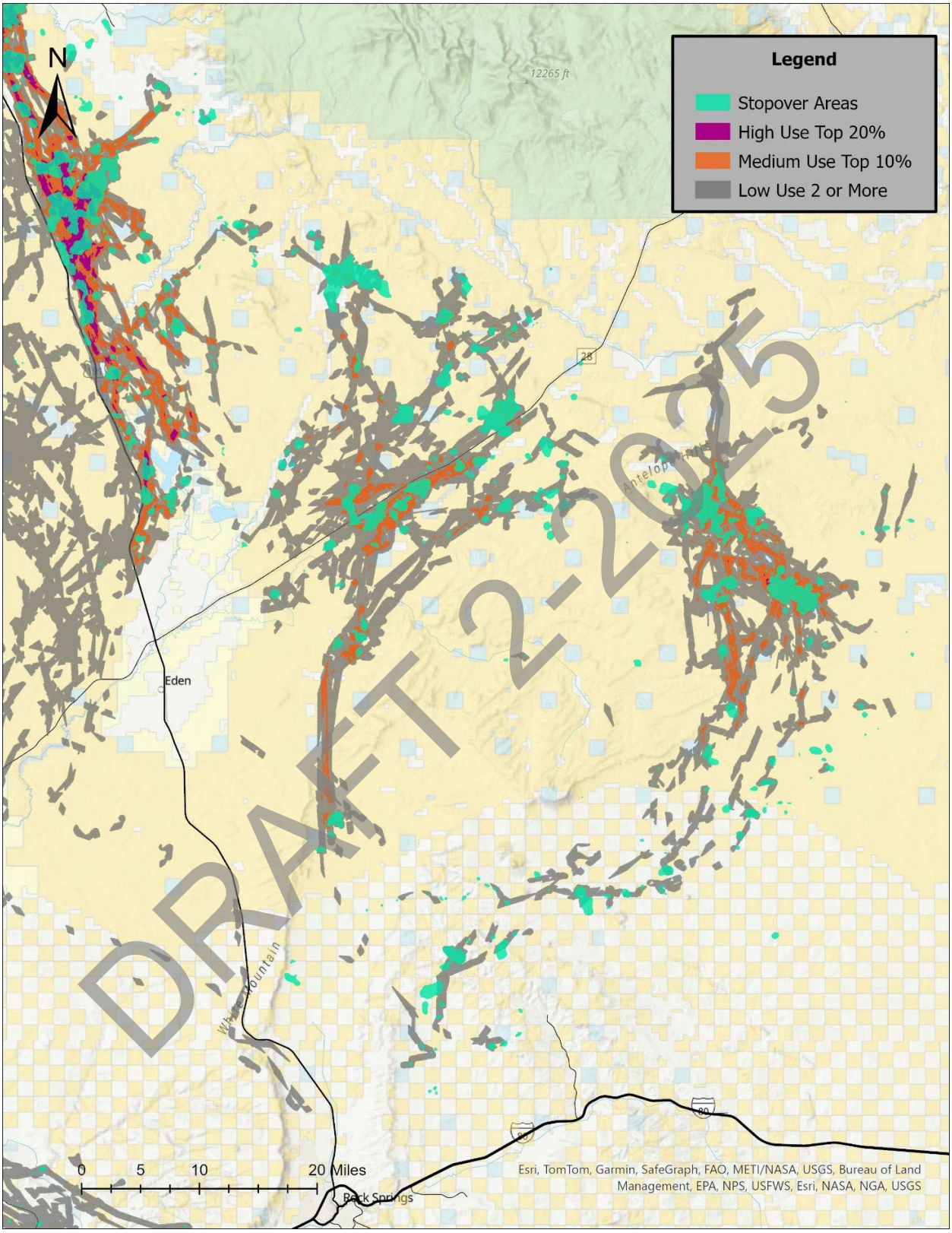
North section of Sublette Pronghorn Migration Corridor



Central section of the Sublette Pronghorn Migration Corridor



Southwest section of the Sublette Pronghorn Migration Corridor



Southeast section of the Sublette Pronghorn Migration Corridor

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Appendix of Methods

In order to provide a better understanding of the data analysis that was completed for this migration corridor, this Appendix provides a summary of the methods used. Significant contributions have been provided by Dr. Jerod Merkle, Assistant Professor, Knobloch Professor in Migration Ecology and Conservation, University of Wyoming, who completed the data analysis for the Wyoming Game and Fish Department for this corridor.

Line Buffer and Brownian Bridge Movement Model (BBMM) analysis:

In the past, designated migration corridors were delineated with the BBMM for both corridors and stopovers (Sawyer et al. 2009). However, more recently, the line buffer analysis method was developed, tested by researchers with GPS collar data and published in a peer reviewed journal (Merkle et al. 2023). BBMM is a complex statistical model designed to account for uncertainty in movement between GPS fixes. BBMMs can produce highly variable corridor widths and non-contiguous corridors that do not fully connect seasonal ranges. These issues are magnified when there is a wide variety of fix rates on collars, such as in the Sublette Antelope herd data. To resolve these limitations, the line buffer method was developed to simplify the approach and allow for a stronger focus on the amount of space required by animals to migrate. The line buffer method simply applies a buffer to the straight line that connects successive GPS locations. Buffer widths can be determined based on the species and herd, depending on field-based knowledge of the needs of the migratory herd. For this herd we buffered each line by 300 meters (i.e., 300 m on each side of the line) which creates a functional corridor width of 600 meters (1,969 feet) for each movement sequence. BBMM is still the best scientific analysis method for identifying stopovers, and thus the BBMM method was used to delineate stopovers for the Sublette antelope herd.

Overall Sample Size:

The Sublette Antelope herd is one of the most data-rich ungulate populations in the world, with nine different GPS collar studies completed from 2002 to 2022. All of these available data were included in this migration corridor analysis. The original dataset included 613 individuals with functioning collars that lived for at least a few months during 2002 to 2022. Individuals had to survive long enough to migrate and had to show migratory behavior to be included in the final analysis. The final sample size for the Sublette Antelope corridors was 415 individuals representing 806 migration sequences. Based on a combination of field knowledge and the assessment of the GPS collar data across the herd unit, we estimate that > 75% of this herd displays migratory movements.

GPS Collar Studies conducted in the Sublette Pronghorn herd that contributed to the corridor delineation

Years	Project	Objective
2002-2003	Kemmerer	Fences and roads as barriers
2003-2004	Grand Teton NP	Jackson Hole movements
2005-2010	Pinedale Anticline	Effects of natural gas development
2009-2017	Pinedale Anticline 2	Effects of natural gas development
2010-2013	Grand Teton NP 2	Jackson Hole movements
2012-2013	Jack Morrow Hills	Movement in the Red Desert
2017-2018	I-80	Influence of climate and I-80
2018-2020	Sweetwater Solar	Effects of solar energy development
2020-2024	Distribution Gaps	Fill in areas between previous studies

Defining Migration:

To isolate sequences of individuals displaying migratory behavior, we used the following definition of migration: movements in spring or fall between distinct summer or winter seasonal ranges. In some cases, antelope made significant movements during winter. Those movements were not included unless they were connected (sometimes through a stopover site) to a spring or fall migration. Net Squared Displacement (NSD) graphs were created for each collared individual for each year, and only data from the migration periods are used for the migration corridor analysis. These graphs demonstrate the distance the individual traveled away from winter range, displayed over the timeframe of one year. The zone where this distance changes rapidly in the spring and fall is the period of migration, highlighted in blue and purple in Figure 1. Figure 1 shows a classic migratory movement sequence, Figure 2 shows a nomadic antelope movement sequence and Figure 3 is a resident antelope movement sequence.

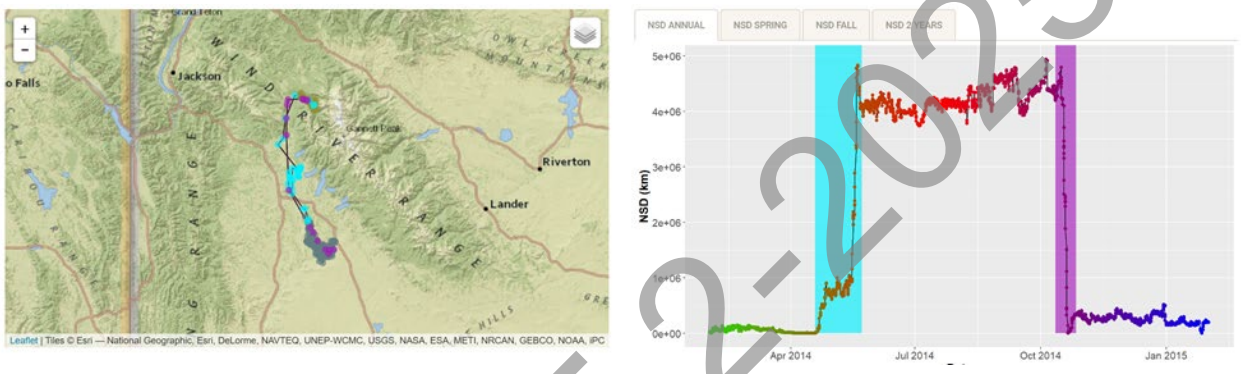


Figure 1. Example movement and net squared displacement graph of a migratory antelope from the Sublette herd. Light blue represents the spring migration sequence and purple represents the fall migration; the light blue and purple symbology on the movement map correspond to the Net Squared Displacement figure.

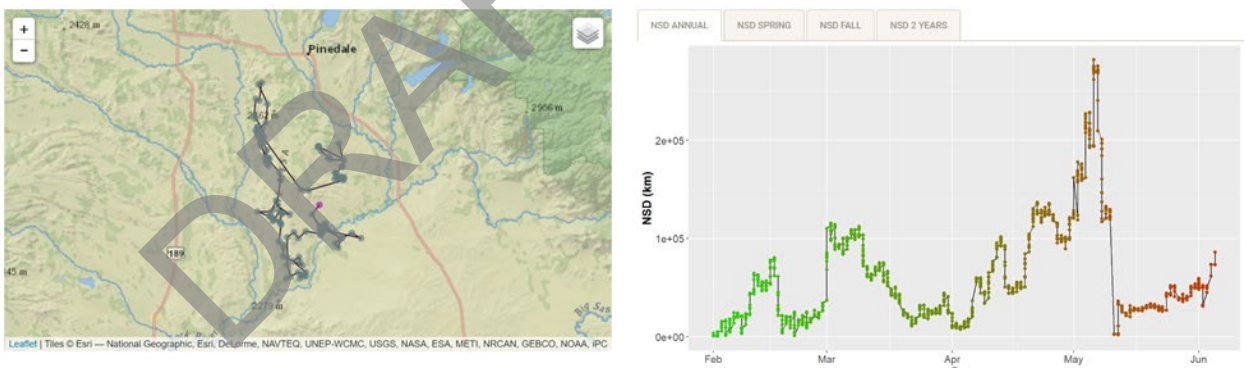


Figure 2. Example movement and Net Squared Displacement graph of a non-migratory nomadic antelope from the Sublette herd that was NOT included in the Sublette migration corridor analysis.

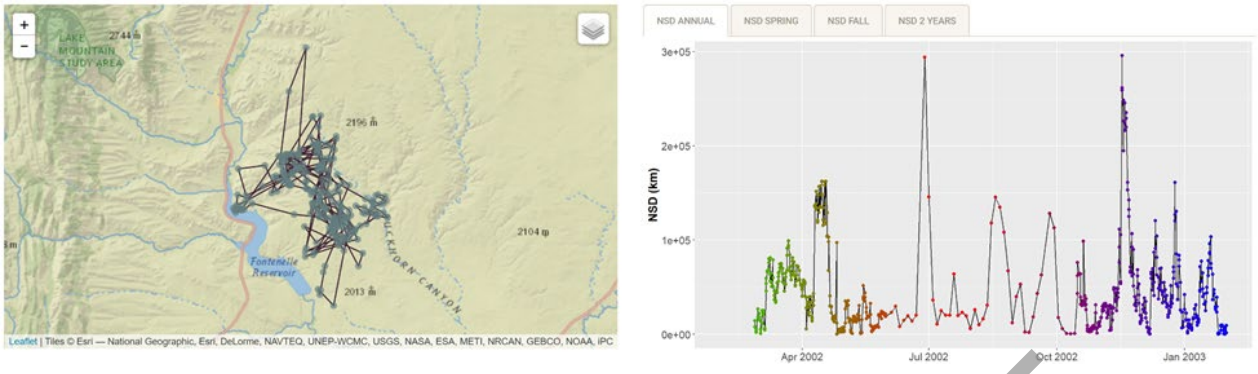


Figure 3. Example movement and Net Squared Displacement graph of a non-migratory resident antelope from the Sublette herd that was NOT included in the Sublette migration corridor analysis.

Sampling bias and subherds:

The sampling effort across the Sublette Antelope herd has not been uniform over time. For example, there have been over 150 individuals captured on the Mesa, whereas only about 50 individuals have been captured in the Southwest part of the herd. Ignoring such inconsistencies can bias migration corridors and stopovers towards areas where collaring effort was higher. To minimize potential sampling bias, the Sublette herd unit was divided into seven distinct subherds (see map-based definitions below). Line buffer and BBMM analyses were conducted separately for each of these subherds, and then merged to create final stopovers and corridors. Individuals that were captured in, or migrated through, each of these subherd areas were assigned to their respective subherd. There was generally little overlap (<2% of individuals) in animal movements between subherds, except in one situation. Most individuals from the North subherd were also found to be in the NE subherd. Thus, individuals that were identified as being in the North subherd were removed from the NE subherd.

Subherd definitions:

- Southwest: West of Green River, North of Interstate 80, South of LaBarge Creek
- Southeast: East of Highway 191, South of Big sandy reservoir
- Northwest: North of North Piney Creek, West of Green River
- Northeast: East of Green River, West of Highway 191 up to trappers point (The Mesa)
- West: South of North Piney Creek, North of LaBarge Creek, and West of Highway 189
- East: East of Highway 191, South of Pinedale, north of Big sandy reservoir, West of little sandy creek
- North: Individuals that migrate north of Upper green

Stopovers:

Stopovers are typically calculated as the top 10% of the area of use within the migration footprint (i.e., low use corridor). The area of use at the subherd level is calculated as the average of the area of use of all individuals in the subherd using the BBMM analysis (see Merkle et al. 2022 for details). In conducting this first analysis of

antelope migration data, it became clear that antelope migration routes are much more spread out and have less overlap than mule deer, resulting in a rather large low-use footprint relative to the area of the high-use corridor. Thus, after careful examination of the location and size of stopovers using different cut-offs, a value of 5% (instead of 10%) was used. This reduced the area of the stopover polygon by half and provided a more realistic representation of what regional biologists observe for this herd.

High-Medium-Low Corridor delineation:

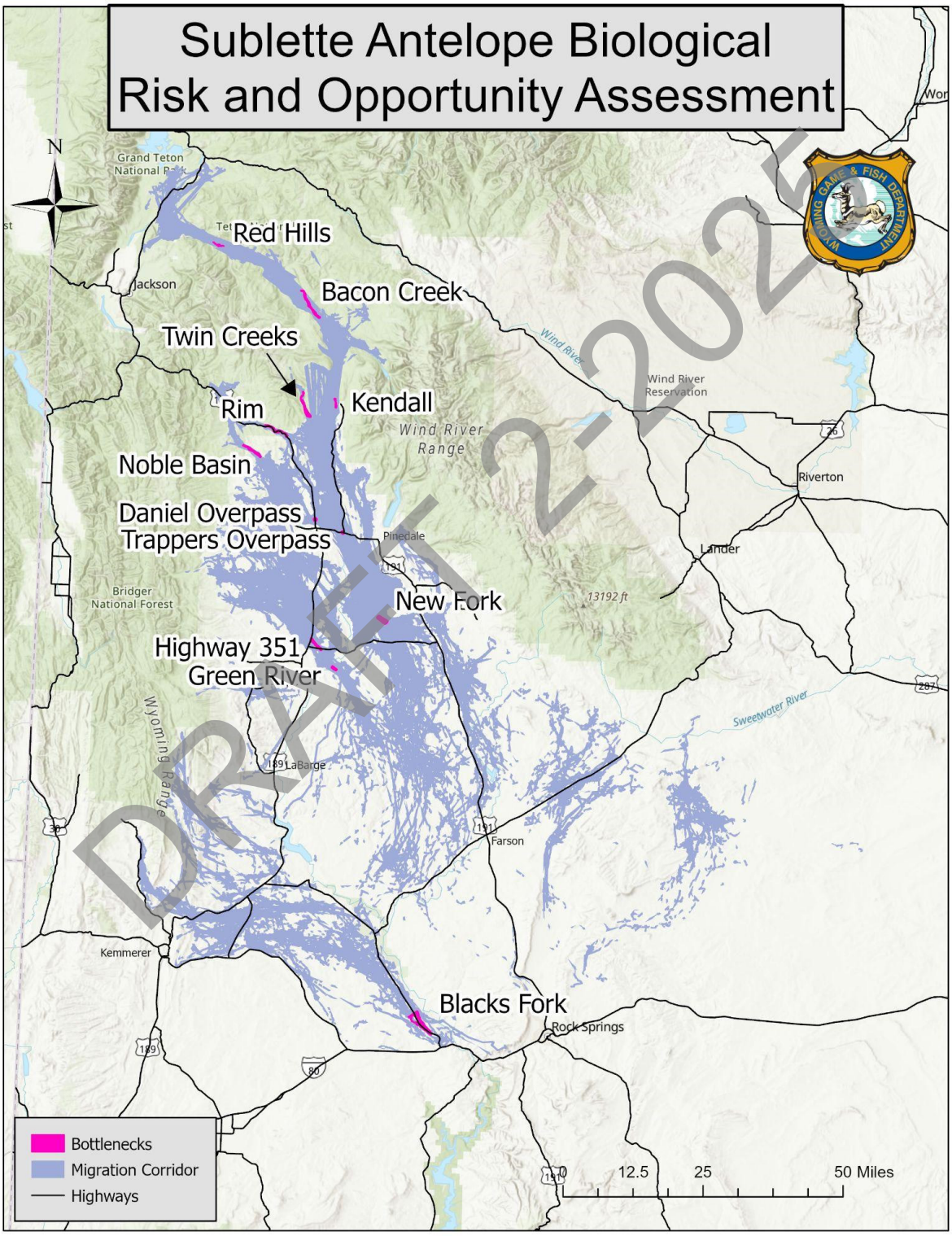
High, medium and low use polygons are mapped to help managers understand the relative use of different parts of the corridor. These corridors are based on 'stacking' up each individual's migration footprints within each subherd, and then calculating the percent of the subherd migrating through (or using) an area of the landscape (see Merkle et al. 2022 for details). Once high, medium, and low use polygons are created for each subherd, they are merged to create the final high, medium, and low use polygons. For the high use corridor, at least 20% of the collared individuals in that subherd have to overlap in their migration footprint polygons. For medium use, at least 10% of the collared individuals' polygons have to overlap. For low use, at least two collared individuals have to overlap in their migration footprints. These distinctions give managers an indication of the proportion of the subherd that use an area during migration or the areas that have high concentrations of migrating animals. Low use areas are not necessarily used by less individuals, but the individuals that use the area are more distributed and less concentrated to major migration habitat areas.

Edits made to maps after initial analysis:

After the initial public review of the maps, several editing processes occurred in order to make the polygons more logically usable on the ground: 1) Disconnected island polygons of the mapped corridor that were less than 100 acres in size were deleted; 2) Islands (holes) polygons of unmapped corridors within the corridor less than .7 acres in size were filled (i.e., absorbed into and become part of the corridor); 3) Stopovers less than 5 acres were deleted; 4) Polygons of the mapped corridor falling outside the Sublette Antelope herd unit in the Carter Lease Herd unit were deleted; and 5) Mapped corridor that lay grossly outside of known antelope movement areas, which were due to long fix rates, in the Upper Green/Gros Ventre were corrected.

APPENDIX B: BOTTLENECKS

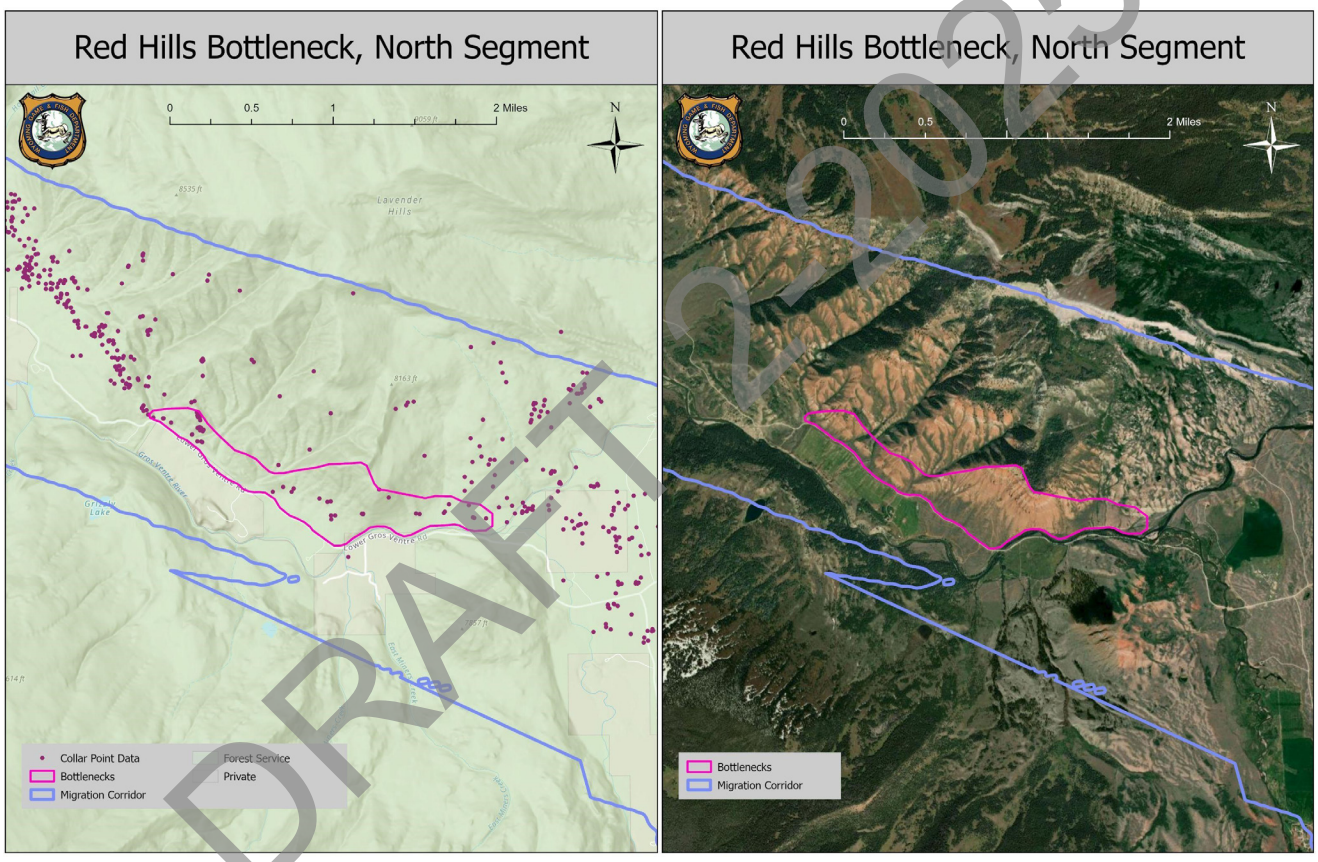
The Bottlenecks can be viewed in more detail by using the Wyoming Game and Fish Department (WGFD) Interactive mapping application on the [Movement Matters website.]



NORTH SEGMENT

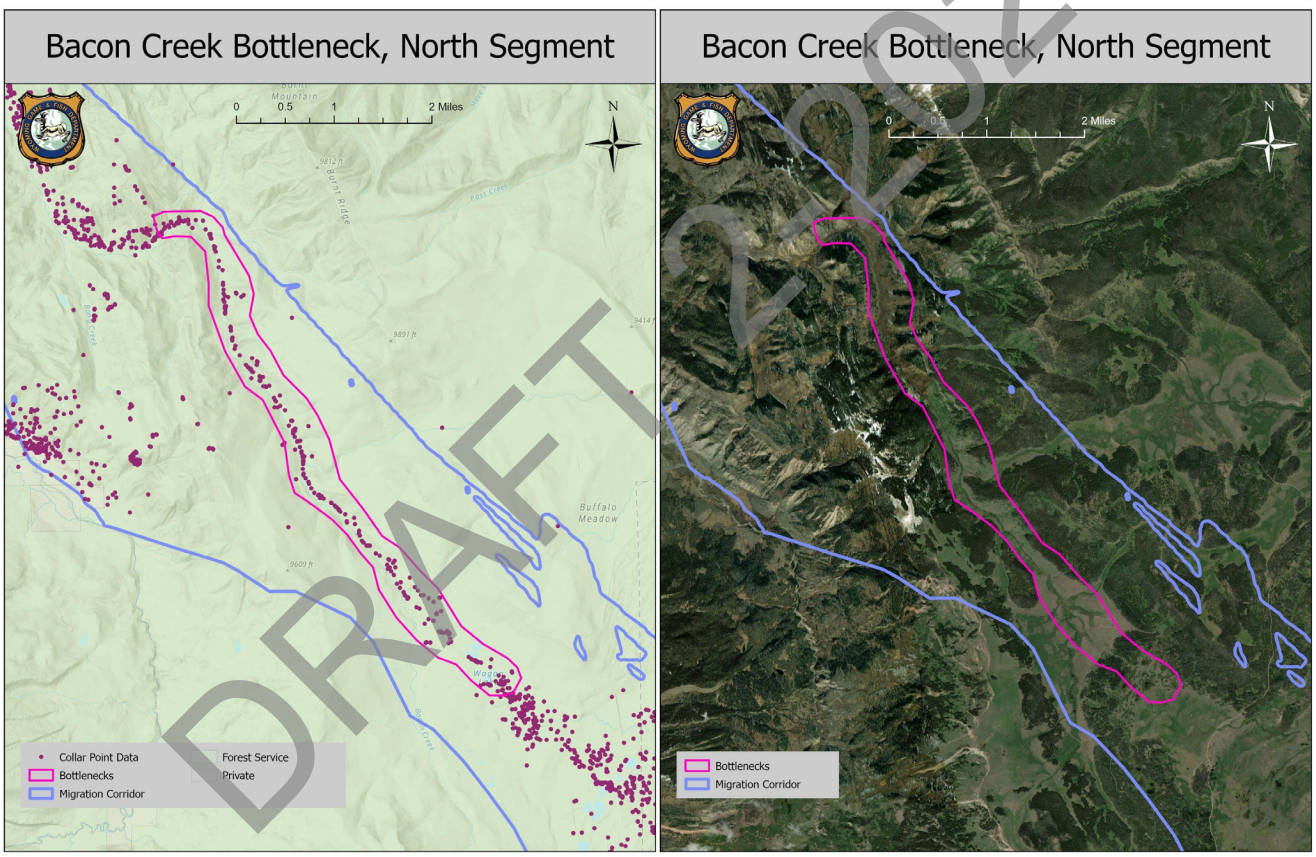
Red Hills Bottleneck

The Red Hills Bottleneck is located entirely on BTNF land. This area has been well documented with camera traps to be restricted down to the width of a two-foot-wide trail in some places where antelope cross challenging topography. All antelope summering in Jackson Hole pass through this bottleneck (see Figure 12 and Appendix B). Recreation impacts, habitat fragmentation and cheatgrass invasion are the primary threats to this bottleneck. Ensuring no new surface disturbance, minimizing new fences, roads and trails, restricting seasonal recreation as well as invasive plant inventory and management via herbicide application are mitigation measures that would help conserve this bottleneck.



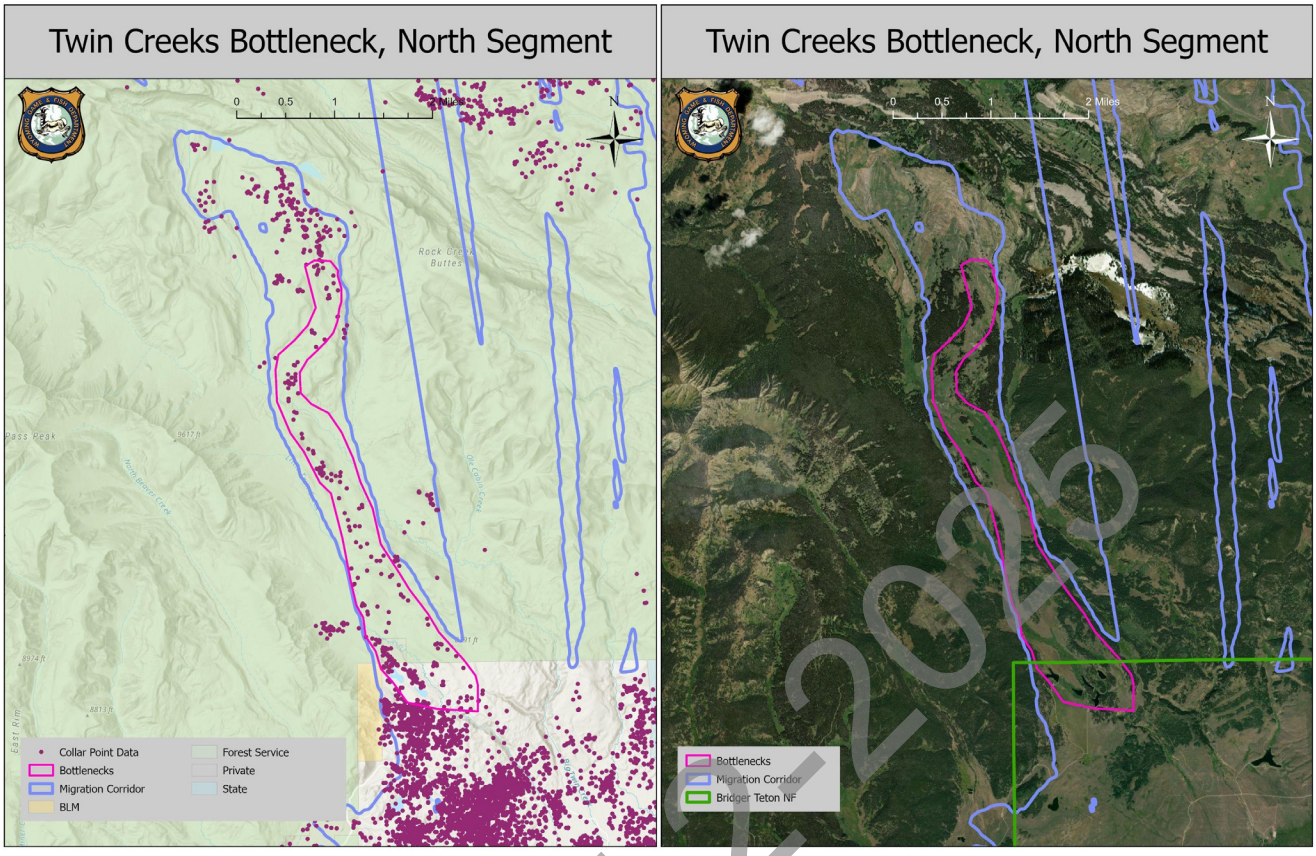
Bacon Creek Bottleneck

The Bacon Creek Bottleneck is located entirely on BTNF land. It is restricted by forested vegetation, which forces antelope to use a narrow riparian area along Bacon Creek. All antelope summering in Jackson Hole or the Gros Ventre River drainage pass through this bottleneck. Habitat fragmentation, conifer encroachment, invasion of cheatgrass and other weeds, and recreation impacts are the primary threats to this bottleneck. Ensuring no new surface disturbance such as mining operations, minimizing new fences, roads and trails, reducing conifer encroachment with vegetation management and herbicide application, and restricting seasonal recreation are mitigation measures that would help conserve this bottleneck. The Pack Trail Wildfire perimeter burned more than half of this bottleneck in 2024, which should help open the forested vegetation (e.g. mitigate conifer encroachment) and be beneficial to antelope. Post-fire invasive plant surveillance and management will be critical components to maintaining bottleneck functionality.



Twin Creeks Bottleneck

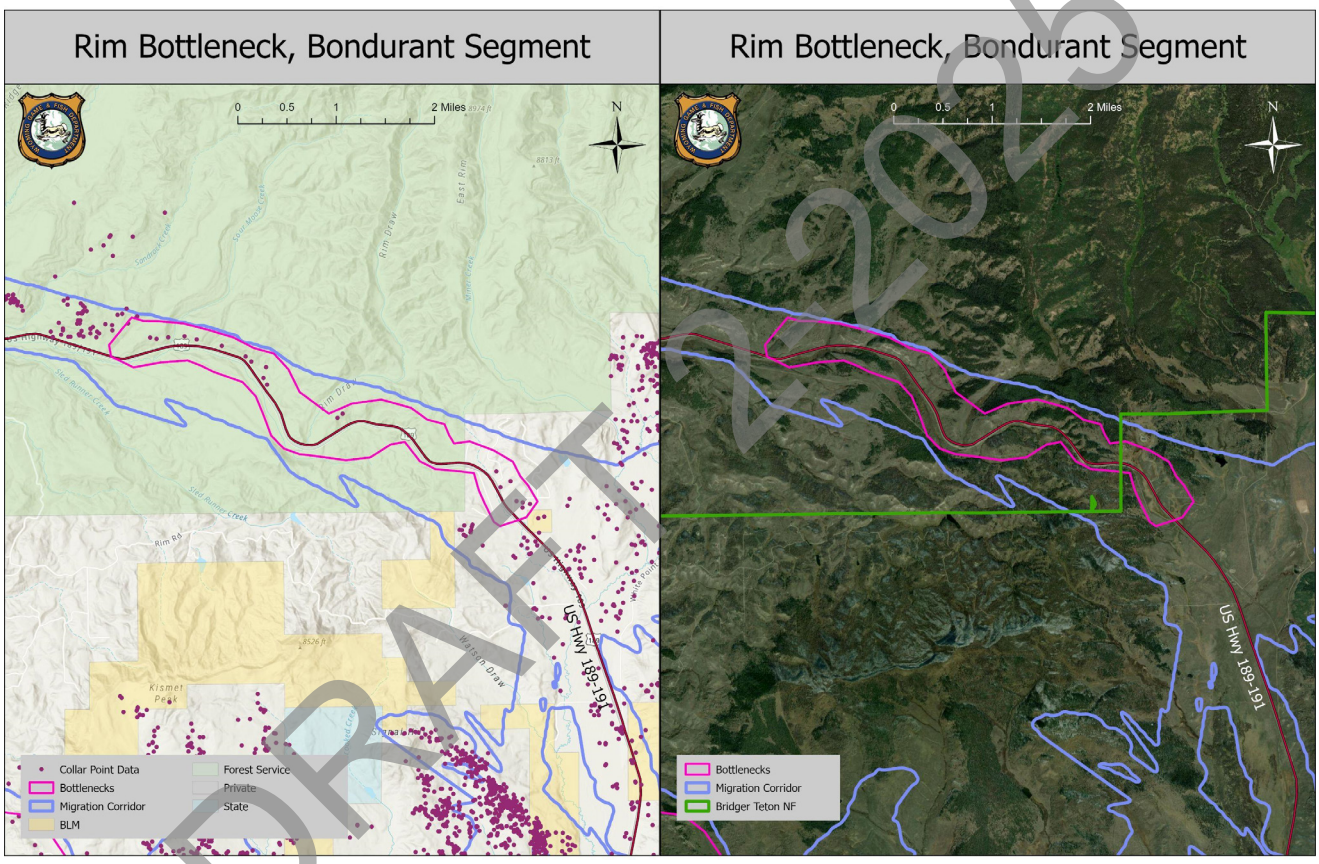
The Twin Creeks Bottleneck is almost entirely on BTNF land. Because it is mostly non-forested, this is the only pathway for a portion of the Herd to access high quality sagebrush, grassland and alpine summer habitats in the Twin Creeks and Tosi Creek basins. Habitat fragmentation and conifer encroachment are the primary threats to this bottleneck. Ensuring no new surface disturbance, minimizing new fences, roads and trails, and reducing conifer encroachment with vegetation management are mitigation measures that would help conserve this bottleneck.


Twin Creeks Bottleneck, North Segment
0
0.5
1
2 Miles
N
Rock Creek Buttes
Pass Peak
9617 ft
8974 ft
8818 ft
East Rim
Collar Point Data
Bottlenecks
Migration Corridor
BLM
Forest Service
Private
State
Twin Creeks Bottleneck, North Segment
0
0.5
1
2 Miles
N
Bottlenecks
Migration Corridor
Bridger Teton NF

BONDURANT SEGMENT

Rim Bottleneck

The Rim Bottleneck is almost entirely on BTNF land. This part of the Corridor is greatly restricted by forested vegetation and U.S. Highway 189-191, and is one of only two pathways which antelope use to seasonally access the Bondurant Basin summer ranges during spring and fall to escape deep snow (see Figure 16 and Appendix B). Habitat fragmentation and conifer encroachment are the primary threats to this bottleneck. Ensuring no new surface disturbance, minimizing new fences, roads and trails, and reducing conifer encroachment with vegetation management are mitigation measures that would help conserve this bottleneck.

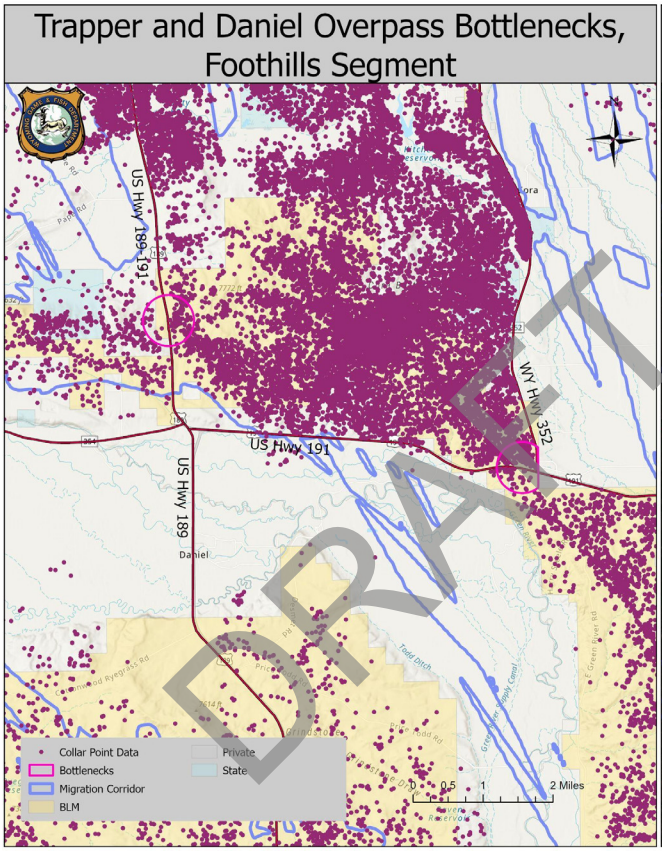


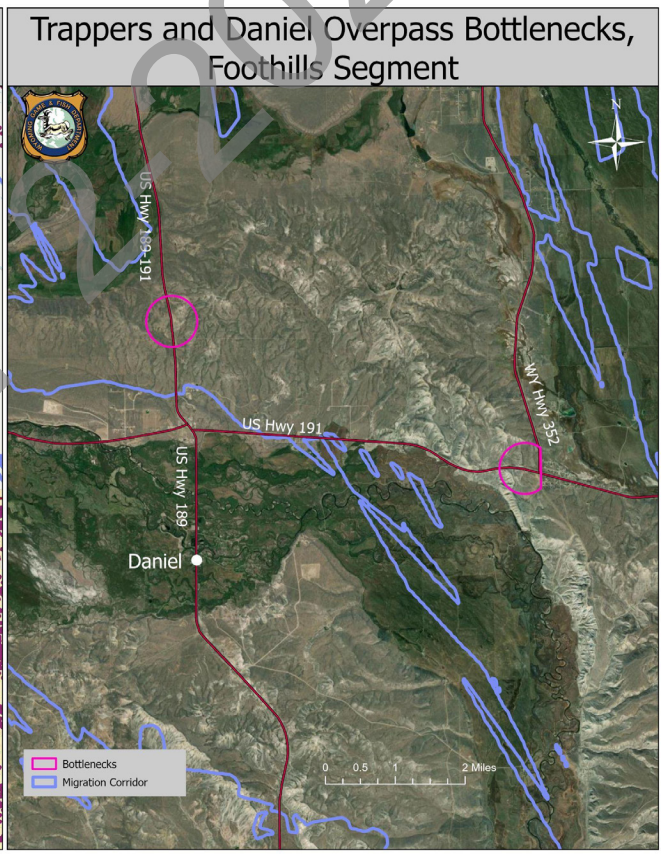
FOOTHILLS SEGMENT

Trappers and Daniel Overpass Bottlenecks

The Trappers and Daniel Overpass Bottlenecks are on BLM land and were mapped due to the restriction around the two overpasses that were constructed in 2012-13 with the Trappers Point wildlife crossing project. An 8-foot-tall, wildlife-proof fence forces migrating ungulates to use these overpass structures when migrating through this part of the corridor. The area surrounding these overpasses is vital for connectivity and to provide consistent access to the crossing structures. Nearly all antelope that move through this wildlife crossing project use one of these two overpasses (see Figure 20 and Appendix B).

Habitat fragmentation is the primary threat to this bottleneck. Ensuring no new surface disturbances are constructed adjacent to the overpass structures, and minimizing new fences, modifying existing fences, and adding fence crossing structures to the approach areas of the structures are mitigation measures that would help conserve this bottleneck. Some of this fence work is currently underway.



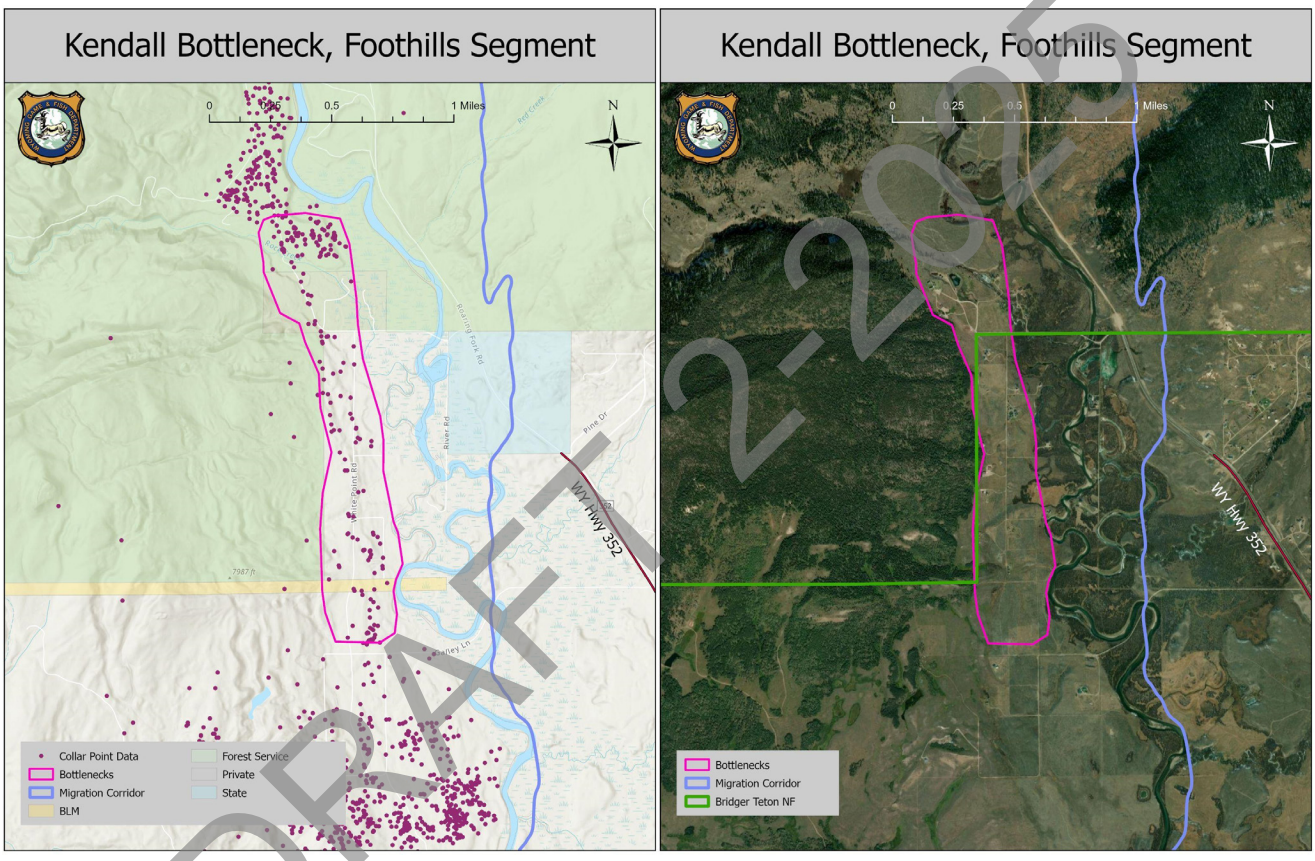


Kendall Bottleneck

The Kendall Bottleneck is located primarily on private land with some peripheral BTNF land in Kendall Valley near the BTNF boundary. This area has a very tight restriction between a dense residential subdivision that includes many fences and forested habitat to the west that is not preferred by migrating antelope. This bottleneck must be passed through in order for antelope to access the BTNF Upper Green, Jackson and Gros Ventre summer ranges. An education and fence mod-

ification project involving the WGFD and private property owners within the Redstone Subdivision, west of the Green River and south of Rock Creek, was conducted from 2004-06 in an effort to maintain antelope movements in this tightly constricted bottleneck. Additional fencing modifications to improve antelope connectivity, led by the Green River Valley Land Trust, were completed between 2010-14. These projects resulted in many property fences being modified or removed, facilitating antelope passage, yet additional opportunities remain for fence modifications within this bottleneck.

Habitat fragmentation from fences or other residential buildings are the primary threats to the Kendall Bottleneck. Reducing surface disturbances associated with new residential development, protecting private lands from development with CE's, minimizing new fences, removing and modifying existing fences, and installing fence crossing structures are mitigation measures that would help conserve this bottleneck.



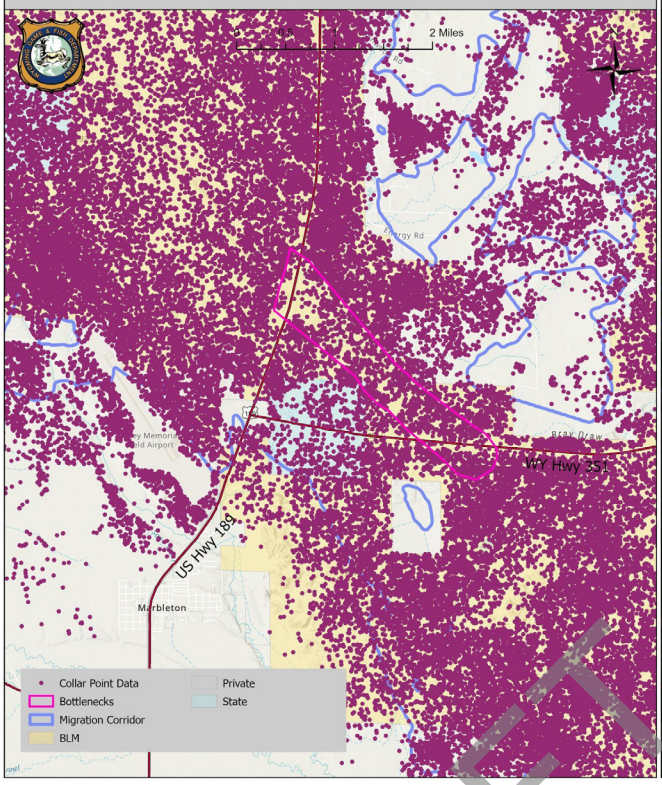
Big Piney Bottleneck

The Big Piney Bottleneck is located primarily on BLM land north and east of the town of Big Piney. The bottleneck is a constriction in a portion of the migration corridor that stretches between Wyoming Highway 351 and U.S. Highway 189. The north part of this corridor includes paired gates in four places located along U.S. Highway 189 north of the Sublette County Fairgrounds. These gates are opened seasonally to improve permeability for antelope to cross the highway during migration. Other restrictions to movement are created by a residential subdivision to the north and a facility with chain link fence to the south. Both restrict movement options for antelope in this part of the corridor.

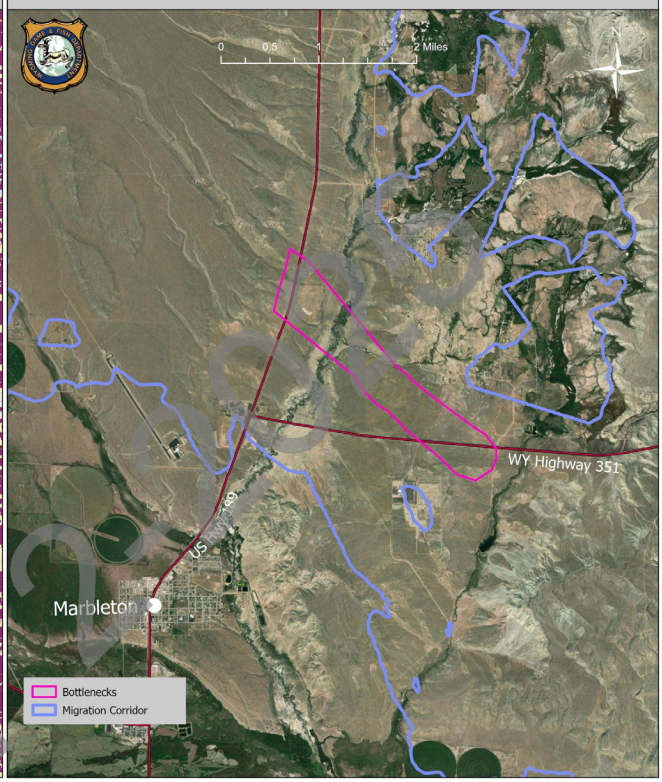
Habitat fragmentation from residential buildings and fences, and the risks of crossing U.S. Highway 189 are the primary threats to this bottleneck. Reducing surface disturbance associated with residential development, protecting private lands from

development with CE's, minimizing new fences, removing and modifying existing fences, installing fence crossing structures, and ensuring no new mining or other commercial development are located within the bottleneck are mitigation measures that would help conserve this bottleneck. Additionally, current fence crossing structures should continue to be opened seasonally to facilitate migrations.

Big Piney Bottleneck, Foothills Segment

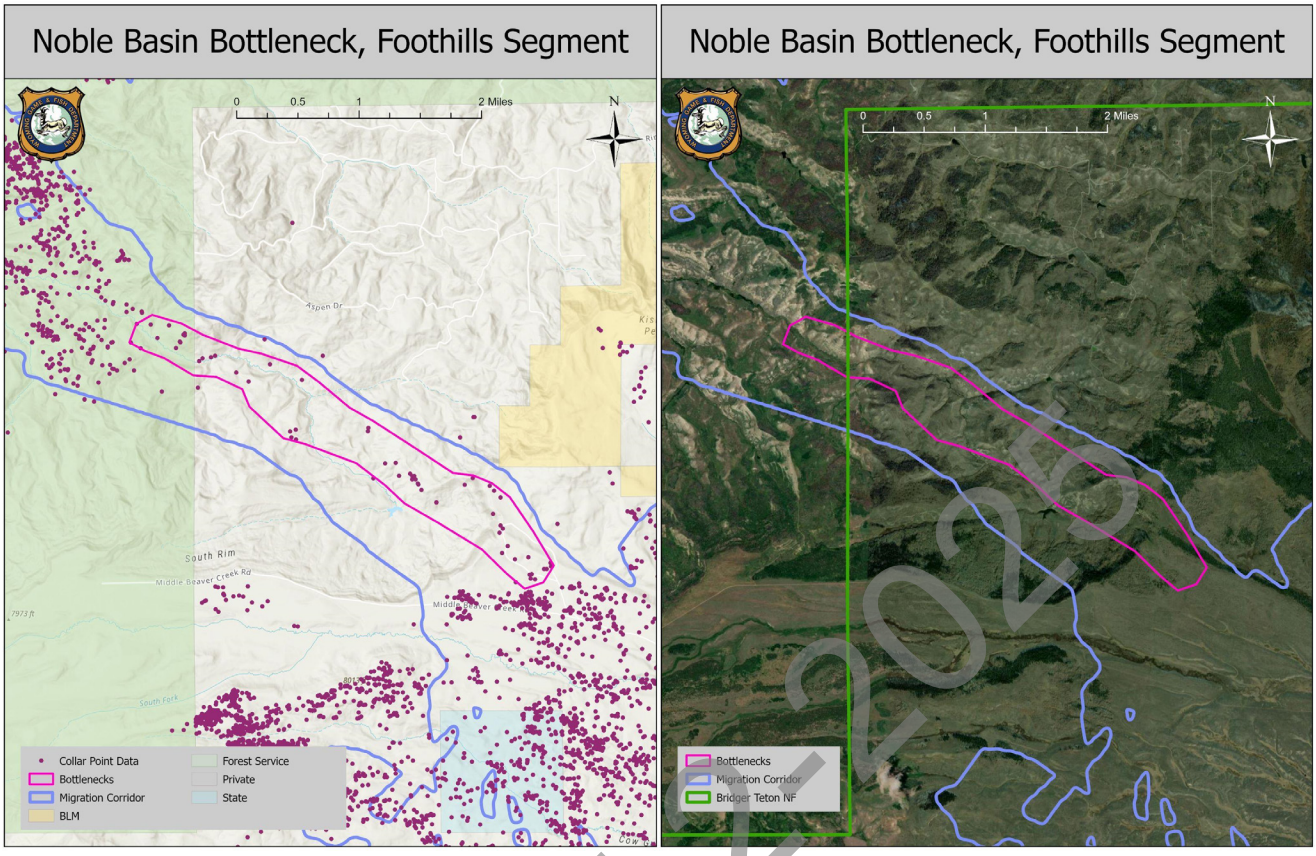


Big Piney Bottleneck, Foothills Segment



Noble Basin Bottleneck

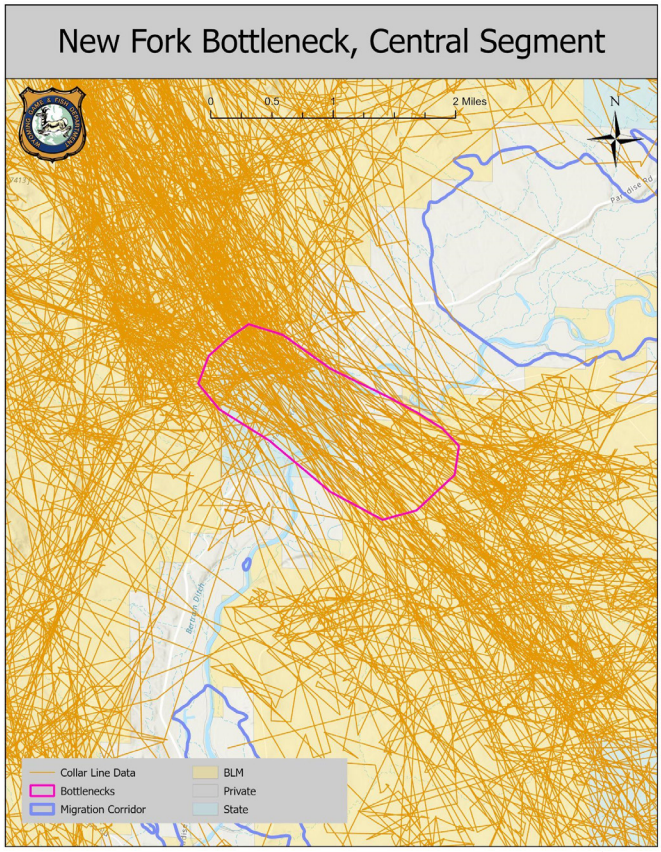
The Noble Basin Bottleneck is primarily on private land, which is all under CE. This is one of only two places antelope are known to access summer range in the Bondurant Basin. This portion is restricted by forested vegetation adjacent to the bottleneck, which limits suitable options for antelope movement. Conifer encroachment and habitat fragmentation from fences are the primary threats to this bottleneck. Reducing conifer encroachment with vegetation management, minimizing new fences and installing fence crossing structures are mitigation measures that would help conserve this bottleneck.

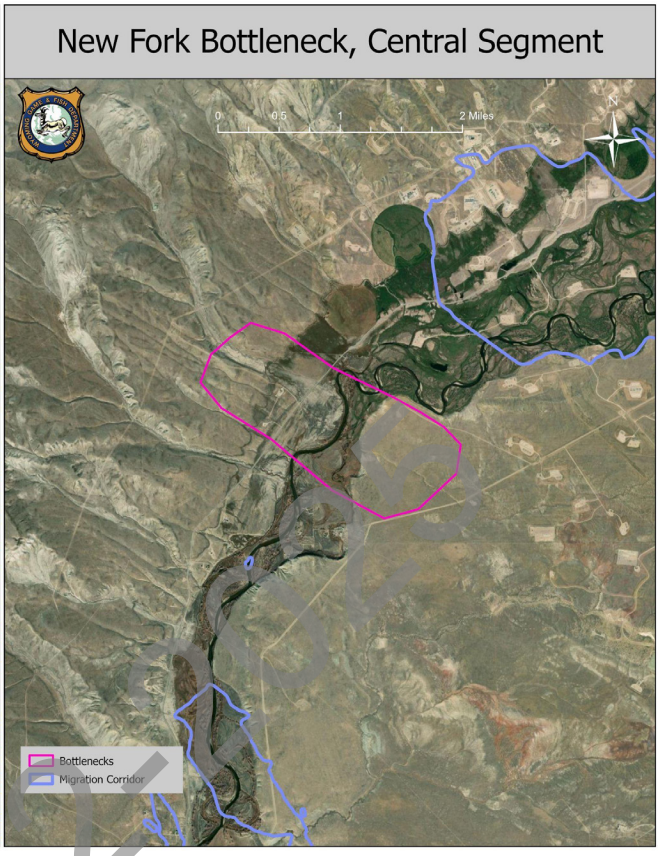


CENTRAL SEGMENT

New Fork Bottleneck

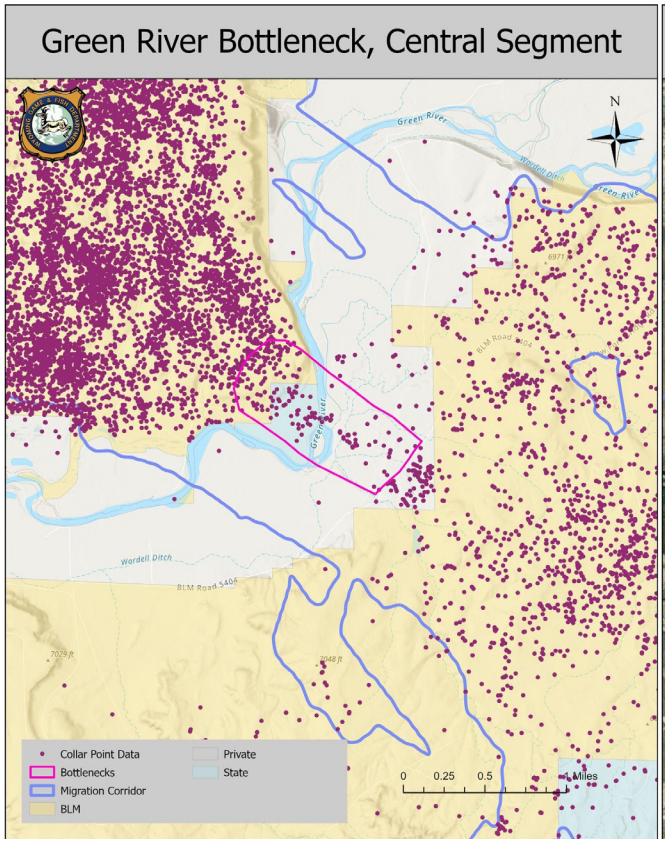
The New Fork Bottleneck is located on BLM, OSLI, and private land and is the primary crossing point of the New Fork River for antelope that winter in habitats to the south. The width of the riparian corridor along the New Fork is noticeably reduced at this bottleneck, providing antelope with a relatively short crossing. This area has existing industrial disturbances along with a residential subdivision to the south. Antelope display limited flexibility in where they cross the New Fork, thus managers are concerned about the potential for new surface disturbances within this bottleneck. Five paired gates were constructed along the ROW fence for Sublette County Road 136 that are opened seasonally to improve permeability for migrating antelope (see Figure 28 and Appendix B). Habitat fragmentation from commercial development such as gravel pits and oil and gas facilities, and additional residential developments are the primary threats to this bottleneck. Preventing any new surface disturbance associated with developments, minimizing new fences, removing and modifying existing fences, and securing CEs are mitigation measures that would help conserve this bottleneck.

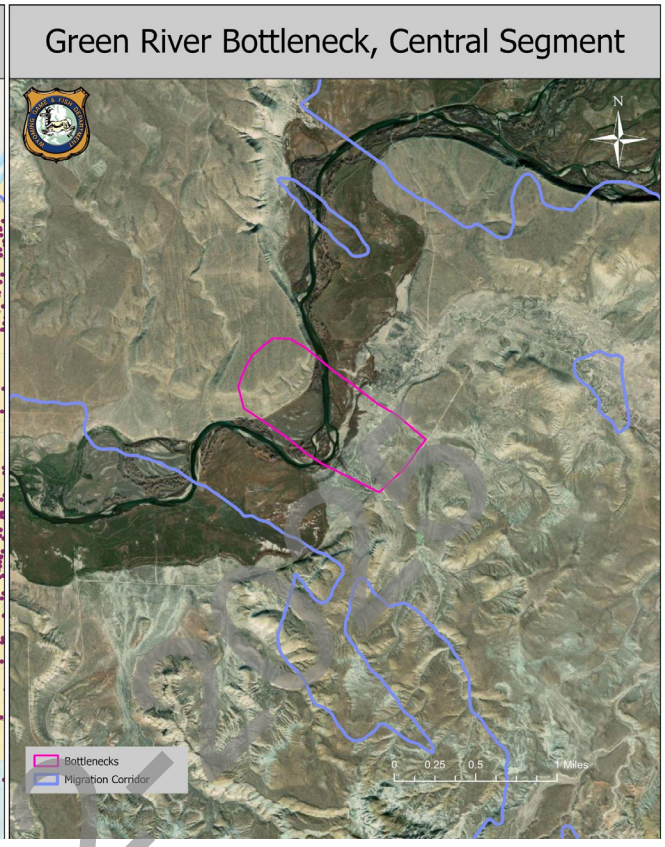




Green River Bottleneck

The Green River Bottleneck is in many ways similar to the New Fork Bottleneck which is located upstream. The Green River Bottleneck also is located on a combination of BLM, OSLI and private lands, and is the primary crossing point of the Green River in a constriction of the riparian vegetation along the river for antelope that winter further south. The OSLI parcel on the north side of the Green River has a high potential for leasing as a gravel pit, which may jeopardize the continued functionality of the bottleneck. Because antelope only have one point they prefer to cross the Green and New Fork rivers within this segment of the Corridor, these bottlenecks are a priority for connectivity. Habitat fragmentation from commercial development such as gravel pits and oil and gas facilities, and additional residential development are the primary threats to this bottleneck. Preventing any new surface disturbances associated with development, minimizing new fences, removing and modifying existing fences, and securing CEs are mitigation measures that would help conserve this bottleneck.

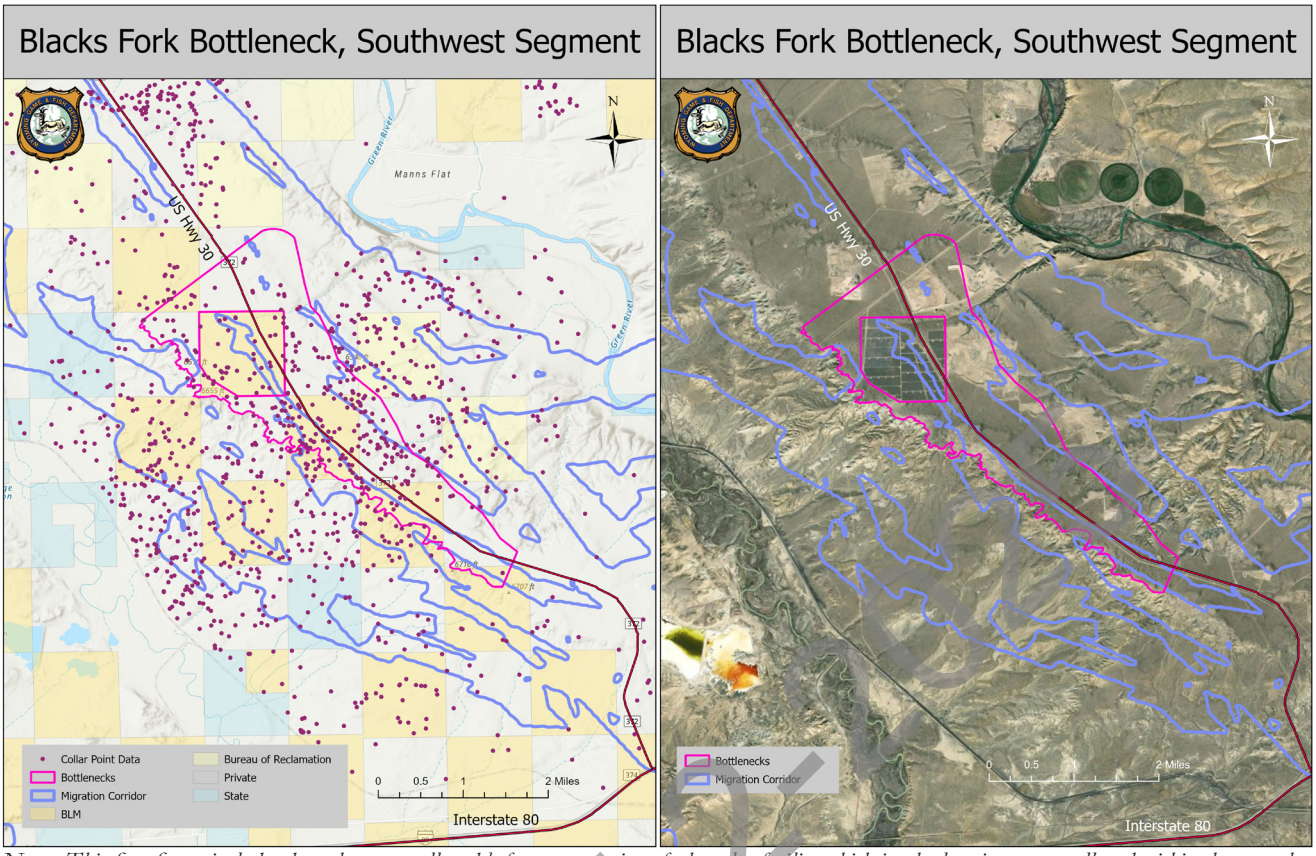




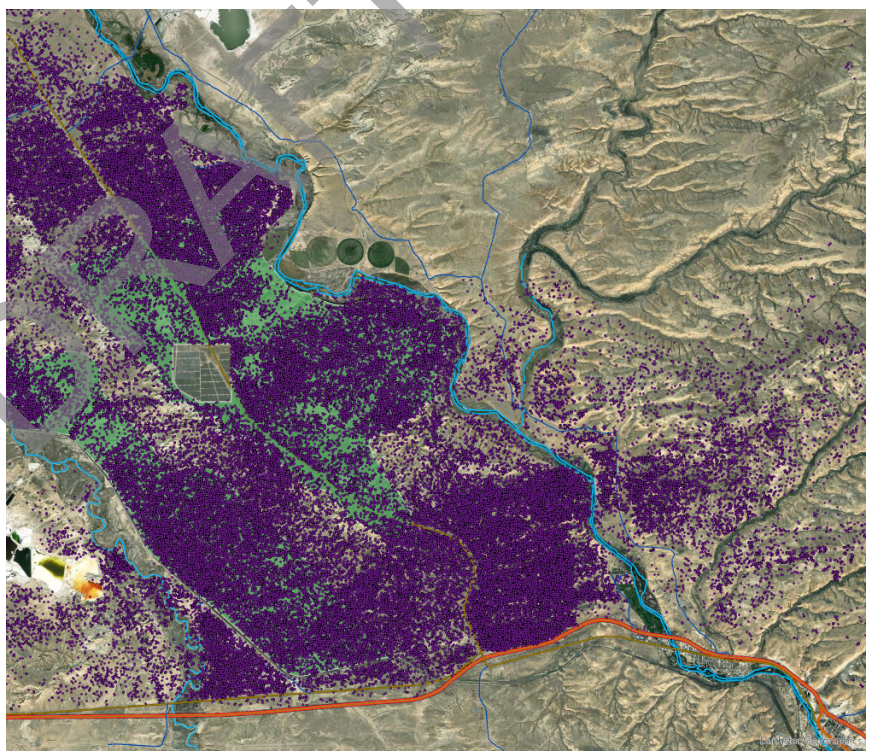
SOUTHWEST SEGMENT

Blacks Fork Bottleneck

The Blacks Fork Bottleneck is located at the southernmost portion of the Corridor west of Rock Springs in checkerboard land ownership. This bottleneck is situated on a sagebrush flat between the Green River and badland breaks to the west. Historically, the area around this bottleneck has seen industrial development largely from gravel mining operations, along with nearby trona mining and processing facilities. Recently, this area has experienced new industrial developments from additional gravel pits and a utility-scale solar facility on the aforementioned sagebrush flat used by antelope to migrate to winter range. The solar facility, which is fenced with 10-foot-tall chain link fencing, has been particularly problematic for antelope trying to access Crucial Winter Ranges, especially during severe winters. During the 2019-20 winter, approximately 1,500 antelope attempting to migrate to winter range were blocked by the solar facility fencing and were forced onto Wyoming Highway 372, creating a safety hazard for motorists and increased vehicle mortality for migrating antelope. Recent collaring efforts (2019-2023) documented the movements of 38 individuals in proximity of this defined bottleneck. Of the 38 antelope, consisting of both resident and migratory individuals, 35 individuals have line movement data that falls within the Blacks Fork bottleneck. Collared individuals do not utilize the riparian river bottom habitats on the Green River and Blacks Fork rivers during the winter, primarily due to broken topography and accumulating snow loads. During harsh winters, large groups of antelope, with upwards of 1,500 or more individuals, commonly move through this bottleneck to Crucial Winter Ranges, often seeking southern aspect slopes along White Mountain and wind blown flats near Interstate 80. During the extreme winter of 2022-23, antelope that were able to make it to areas south of this bottleneck experienced higher survival relative to the rest of the herd.



Note: This first figure includes data that was collected before construction of the solar facility which is why locations were collected within the area that currently contains the exclusion fence.



Map depicting GPS collar locations of antelope in the vicinity of this bottleneck. Points were collected in all seasons, after construction of the solar facility and after the corridor polygon analysis was completed (Sawyer et al. 2022).