BIGHORN SHEEP UNIT MANAGEMENT PLAN
NINE MILE WMU #11
Gray Canyon / Jack Creek
August 2019

BOUNDARY DESCRIPTIONS

Carbon, Duchesne, Emery, and Uintah -

Gray Canyon - Carbon, Duchesne, and Emery counties--Boundary begins at exit 164 on I-70 near the town of Green River; west on I-70 to US-6; north and west on US-6 to SR-123; east and north on SR-123 through the town of Sunnyside to the Water Canyon/Bruin Point Road; northeast on this road to the summit at Bruin Point and the headwaters of Range Creek; southeast along the Range Creek drainage bottom to the Green River; south along the Green River to Swasey's Boat Ramp and the Hastings Road; south on this road to SR-19; south and east on SR-19 to Exit 164 on 1-70 near the town of Green River. Excludes all CWMUs.

Jack Creek - Carbon, Duchesne, Emery and Uintah counties--Boundary begins at US-40 and US-191 in Duchesne; southwest on US-191 to US-6; southeast on US-6 to SR-123; east and north on SR-123 through the town of Sunnyside to the Water Canyon/Bruin Point Road; northeast on this road to the summit at Bruin Point and the headwaters of Range Creek; southeast along the Range Creek drainage bottom to the Green River; south along this river to Coal Creek and the Uintah and Ouray Indian Reservation boundary; east along this boundary to the drainage divide at Hells Hole/Head of Sego Canyon; northeast along the drainage divide and summit to Diamond Ridge; northeast continuing along the drainage divide and summit to the Seep Ridge Road; northwest along the Seep Ridge Road to the White River; west along this river to the Green River; north along this river to the Duchesne River; west along this river to US-40 at Myton; west on US-40 to US-191 in Duchesne. EXCLUDES ALL NATIVE AMERICAN TRUST LANDS WITHIN THIS BOUNDARY. Excludes all CWMUs. USGS 1:100,000 Maps: Duchesne, Huntington, Price, Seep Ridge, Vernal, Westwater. Boundary questions? Call the Price office, 435-613-3700

LAND OWNERSHIP

Land ownership and approximate area of modeled bighorn sheep habitat for the Nine Mile bighorn sheep management unit.

Gray Canyon

Ownership	MODELED BIGHORN HABITAT	
	Area (acres)	%
Bureau of Land Management	132,401	84.4%
Utah State Institutional Trust Lands	16,882	10.8%
Private	7,453	4.8%
State Sovereign Land	48	<0.1%
Totals	**156,785**	**100%**

Jack Creek

Ownership	MODELED BIGHORN HABITAT	
	Area (acres)	%
Bureau of Land Management	355,218	39.2%
Tribal	280,130	30.9%
Private	117,853	13.0%
Utah State Institutional Trust Lands	107,672	11.9%
National Forest	38,857	4.3%
Utah Division of Wildlife Resources	6,554	0.7%
State Sovereign Land	454	0.1%
Utah Department of Transportation	2	<0.1%
Totals	**906,740**	**100%**

UNIT MANAGEMENT GOALS

The Nine Mile Bighorn Sheep Unit is located in eastern Carbon and Emery Counties and is centered primarily along the Green River and Price River corridors. It consists of relatively dry habitat more indicative of desert bighorn habitat in the state of Utah. The vast majority of the bighorn sheep reside in the lower reaches of Gray Canyon near the town of Green River. The northern reaches of this part of the population goes as far north as the town of Sunnyside. Bighorn sheep were moved in to Jack Creek in upper Desolation Canyon in 2000 and 2001. These bighorns exist approximately 60 miles north of the main core herd in Gray Canyon with presumably very little interchange (Figure 1). Most bighorns are found at elevations of 4,000 feet on the desert floor to 7,000 feet in the upper reaches of the canyons. Ram groups have been

known to occasionally occupy elevations approaching 8500 feet during the summer months. The vast majority of the habitat is characterized by open grassy slopes with cheatgrass and native grasses with dispersed stands of greasewood, shadscale, and saltbush. Pinyon-juniper stands begin to predominate at upper elevations and along north facing slopes with sagebrush being the primary browse species. Winters are mild on this unit with green forage available throughout much of late winter and spring. Lush vegetation and water availability during the hot, dry summer months may be more of a limiting factor. Specific goals are to:

1) Manage for a healthy population of Rocky Mountain bighorn sheep capable of providing a broad range of recreational opportunities, including hunting and viewing.
2) Balance bighorn sheep impacts with other uses such as authorized grazing and local economies.
3) Maintain a population that is sustainable within the available habitat in the unit boundary.

HISTORY AND CURRENT STATUS

Rocky Mountain bighorn sheep were established on this unit by transplants to the Price River and Range Creek drainages in 1993 and 1995 from Colorado. These bighorn sheep adapted well to the dry conditions and thrived. A hunt-able population was established by the year 2000. This population has expanded quickly over the past 20 years. The first helicopter survey in 1998 found 56 total bighorns. By 2011, there were 418 sheep observed suggesting the herd had increased eightfold in a 13 year period. In recent years this population has been exposed to pathogens that have resulted in respiratory disease that have caused declines in bighorn abundance. The current population estimate is 345 bighorn sheep based on a 2016 helicopter survey count of 207 animals. As previously mentioned, bighorns were moved in to the Upper Desolation Canyon in 2000 from Bare Top Mountain, UT and the Bitteroot Valley, MT. This portion of the herd is now approximately 95 sheep. A Jack Creek subunit was formed and was hunted for the first time in 2017. An additional transplant was attempted in 2009 when 40 bighorn were captured in the Price River area and flown 30 miles north to the Trail Canyon area in lower Desolation Canyon. These bighorns promptly returned to where they were captured within six months.

Significant efforts were made by the BLM, DWR and UFNAWS in the late 1980's to assure that domestic sheep grazing issues were resolved prior to the original transplant. As a result of this and later efforts to accommodate and expanding bighorn population, there are no active domestic sheep allotments on the Nine Mile unit. However, this unit has an abundance of private land managed for livestock grazing that is adjacent to bighorn habitat. Some of these landowners graze sheep on their properties. Binding agreements to not graze sheep on private lands have been made with some landowners. Future agreements are necessary to facilitate bighorn herd protection in core areas and expansion in to the Nine Mile Canyon area.

ISSUES AND CONCERNS

Potential Habitat: We modeled potential bighorn sheep habitat on the Nine Mile unit using methodology outlined by O'Brien et al. (2014). Bighorn sheep select habitat based on the proximity of steep-sloped escape terrain, forage availability, ruggedness, and horizontal visibility

(Bleich et al. 1997, Valdez and Krausman 1999, Sappington et al. 2007). Bighorn sheep habitat is located throughout the unit in suitable rugged locations (Figure 1).

Livestock Competition: Bighorn sheep annual use of forage classes, when compared to cattle, differ significantly (Dodd and Brady 1988). Likewise, bighorn sheep generally avoid areas where cattle are present (Bissonette and Steinkamp 1996), and also select areas with a much higher degree of slope (Ganskopp and Vavra 1987). For these reasons, competition between cattle and bighorns should not be a significant concern within this unit. Because of the risk of pathogen transmission between bighorns and domestic sheep, the areas where domestic sheep are present are not suitable for bighorn sheep.

Disease: Disease, especially bacterial pneumonia, has been responsible for numerous declines in bighorn populations throughout North America (Cassirer and Sinclair 2007). Pneumonia outbreaks typically affect all age/sex cohorts and are usually followed by several years of annual pneumonia outbreaks in lambs that dramatically reduce population growth (Spraker et al. 1984, Ryder et al. 1992, George et al. 2008). These events are attributed to the transfer of pathogens from domestic sheep (*Ovis aries*) or goats (*Capra aegagrus hircus*) to wild sheep through social contact (Singer et al. 2000, Monello et al. 2001, Cassirer and Sinclair 2007). Disease-induced mortality rates in bighorn sheep vary substantially by population due to multiple processes including contact rates, social substructuring, pathogen virulence, and individual susceptibility (Manlove et al. 2014, 2016). Therefore, spatial separation from domestic sheep and goats is the most important factor in maintaining overall herd health. It is not the intent of this plan or the DWR to force domestic sheep operators off public lands or out of business. Rather, the intent is to look for opportunities that will protect bighorn sheep populations while working with the domestic sheep industry and individual grazers.

Predation: Cougar predation may limit bighorn sheep in locations where predator populations are largely supported by sympatric prey populations (Hayes et al. 2000, Schaefer et al. 2000, Ernest et al. 2002), which, in this case, includes a limited amount of mule deer. It has been hypothesized that declines in sympatric ungulate populations can increase predation on bighorn sheep as cougars switch to bighorns as an alternate prey source (Kamler et al. 2002, Rominger et al. 2004). It is anticipated that cougars will be the main predator of bighorns in the Nine Mile unit. If predation becomes a limiting factor, predator control work will be administered within the guidelines of the DWR Predator Management Policy. Predator management is coordinated with USDA Wildlife Services.

POPULATION MANAGEMENT

Population Management Objective:

1) Manage for up to 1,000 bighorn sheep throughout suitable habitat on the Nine Mile Unit of which no more than 650 sheep should be in the main core area on the Gray Canyon subunit. A population of 1000 sheep would be below the recommended density of 1.3-1.9 bighorns/sq km (Van Dyke 1983); however if disease issues becomes a concern local densities may be reduced.

Population Management Strategies:

1) Conduct transplants on or off the unit as needed to meet population objectives as allowed by disease conditions in source and receiving herds.
2) Utilize ewe hunts as needed to target bighorn sheep inhabiting areas with a high potential for comingling with domestic sheep.
3) Ewe hunts could also be used as a tool to regulate overall population levels and localized bighorn sheep density issues if disease issues prevent transplants.
4) Conduct adequate disease sampling of bighorn sheep on the unit as needed to develop a disease profile.

Population Monitoring Plan:

Continue aerial surveys of the unit every three years to monitor total population and herd composition. Approximately 8 hours are required to fly Jack Creek and an additional 20 – 25 hours for Gray Canyon. Monitor survival, habitat use, and potential disease issues through continued radio telemetry studies on the unit. Conduct ground classification as conditions permit to obtain annual production estimates. This information is highly valuable as an indicator of population health and condition. This is typically done via a Desolation Canyon float trip conducted every other year. All population data will be collected and submitted on standardized forms, including all GIS flight and collar data (waypoints, flight paths, etc.).

Trend Count and Classification Data

Year	Pop Est	Total Count	Total Ewes	Total Lambs	Total Rams	Rams > 6 yrs old	Lambs/100 Ewes	Rams/100 Ewes
1997	90	56	20	20	16	-	100	80
1998	175	106	49	23	34	5	47	69
2000	210	128	57	30	41	16	52	72
2001	300	179	80	43	56	24	54	70
2003	350	213	105	39	69	16	37	65
2005	500	293	135	60	98	33	44	73
2007	600	346	156	80	110	35	51	70
2009	650	384	190	47	147	43	25	77
2011	700	418	206	69	143	51	33	69
2013	600	333	165	57	111	42	34	67
2016	440	264	153	29	82	26	19	54
(‘16 Gray Cyn)	345	207	119	20	68	20	17	57
(‘16 Jack Cr)	95	57	34	9	14	6	26	41

Transplant Plan:

This unit should be managed to maintain and protect established bighorn sheep numbers and achieve unit population management goals. The disease profile of the herd and the relative health of the herd based on composition should be carefully evaluated prior to any transplant.

Transplants to the unit may be necessary in future years to augment the existing herd or to expand the population if spatial separation from domestic sheep can be ensured. Potential future transplant areas should include:

-Nine Mile Canyon
-Rock Creek
-Trail Canyon

Predator Management:

The Nine Mile bighorn sheep unit is managed under a predator management plan. The unit is designated as a bighorn sheep protection area with a liberal cougar harvest quota and a year-round cougar hunting season. Sport harvest averages 16 cougars/year. A total 166 cougars have been removed from the unit over the past 10 years. However, the vast majority of cougar harvest occurs well away from most bighorn sheep habitat. Cougar harvest is difficult in bighorn sheep habitat as there are relatively few snow days for good tracking, extremely rough terrain, and low cougar densities. A year-round hunt unit focusing on bighorn sheep habitat on the Gray Canyon and Book Cliffs, South units was established in 2017. To date, only 1 cougar has been harvested by sport hunters on this portion of the unit in the past 3 years. If cougar predation on the unit is shown to have adverse impacts on bighorn sheep, cougar population control will be accomplished through established UDWR policy and procedures.

Research Needs:

1) Continued GPS collar studies are needed to document survival, production, habitat use, and potential comingling with domestic sheep. This will also provide an avenue to collect blood and nasal cultures to maintain an accurate disease profile.
2) Document bighorn sheep use (or lack of use) of newly constructed guzzlers.

DISEASE MANAGEMENT

Disease Management Objective:

1) Maintain a healthy population of Rocky Mountain bighorn sheep on the Nine Mile unit.
2) Maintain spatial separation from domestic sheep and goats.

Disease Management Strategies:

Disease Monitoring: The DWR may perform periodic live captures to assess herd health, as well as take advantage of opportunistic sampling of hunter harvested bighorns or bighorns that are found dead. Exposure to *Mycoplasma sp.* has been documented in this herd. Twelve out of 20 (60%) sheep showed exposure to *Mycoplasma sp.* in 2014. An additional 20 sheep were sampled in 2015. In this study, 90% of the bighorns showed exposure to *Mycoplasma sp.* These studies also showed moderate exposure to Parainfluenza and EHD. Exposure rates appeared consistent across Jack Creek, Gray Canyon, and the adjacent Book Cliffs, South unit. These findings will influence future management.

Spatial Separation: Work with land management agencies and private landowners to implement agency guidelines for management of domestic sheep and goats in bighorn areas. The most likely dispersal areas will be eastward along the Book Cliffs to the Colorado border. There are 4 primary threats that challenge effective separation:

1) Farm flocks on private lands in the Green River Valley - Much of the land immediately adjacent to bighorn sheep habitat near the town of Green River is privately owned and managed for livestock grazing or row crops. Some landowners own small flocks of sheep and occasionally these sheep escape and are found in bighorn habitat. Currently none of the landowners closest to bighorn sheep have domestic sheep. Great effort is needed to keep good relationships with landowners.
2) Farm flocks on private lands in Nine Mile Canyon – Some landowners in Nine Mile Canyon have small bands of sheep that reside on private lands in the canyon. Bighorn sheep have been documented comingling with these sheep Bighorn sheep are typically within 6 miles of the nearest domestic sheep in Nine Mile Canyon.
3) Farm flocks on private lands near Sunnyside and Columbia - Landowners in these areas occasionally have domestic sheep on their properties. Some sheep have escaped over the years and have been found comingling with bighorn in bighorn habitat. Public education, double fencing, and binding agreements are necessary to avoid future comingling. Bighorn sheep are within 1 mile of some domestic sheep in this area.
4) Wild Horse Bench, Big Pack, and Oil Shale Allotments east of the Green River- Several BLM domestic sheep allotments exist approximately 15 miles northeast of occupied bighorn habitat on the northeast corner of the unit.

Outreach efforts should take place with private landowners, grazing permittees and BLM employees concerning domestic and wild sheep interactions. Active removal of bighorn sheep within or close to these allotments and properties should be a priority.

Risk Management and Response Plan:

Areas of greatest concern for dispersing bighorn sheep include all areas north of C Canyon near the town of Sunnyside as well as bighorn sheep in lower Nine Mile Canyon near domestic sheep flocks. Any bighorn sheep in these areas should be removed immediately. All wandering bighorn sheep, stray domestic sheep and goat issues will be handled following the UDWR GLN-33 and the UDWR Statewide Bighorn Sheep Management Plan. The need to test wandering bighorn sheep from this unit will be evaluated on a case by case basis.

HABITAT MANAGEMENT

Habitat Management Objectives:

1) Maintain or improve sufficient bighorn sheep habitat to achieve population objectives.
2) Continue to identify crucial bighorn sheep habitats and work with land managers and private landowners to protect these areas.
3) Assist land management agencies in monitoring bighorn habitat to detect changes in

habitat quantity or quality.

4) Work with land managers to minimize and mitigate loss of bighorn habitat due to human disturbance and development.

Current and Potential Bighorn Sheep Distribution:

Bighorn sheep high density core use areas are primarily in Gray Canyon along the Green River and lower Price River as well as the area surrounding Jack Creek in upper Desolation Canyon. Sheep could expand in to the middle and lower portions of Desolation Canyon, westward in to Nine Mile Canyon, and the upper elevations throughout the West Tavaputs Plateau. A map of wild sheep distribution and modeled habitat is provided in Figure 1.

Potential Threats to Habitat:

1) Human disturbance can result in abandonment or degradation of bighorn habitat. Human use along the Green River is very high in the summer months. To date, no adverse effects to bighorn sheep have been documented by high river runner traffic during the summer months.
2) Significant oil and gas leases have been approved and developed on bighorn sheep habitat near the Jack Creek area. Most of the proposed and developed wells are in flat areas above good bighorn habitat. There is, however, potential that these areas could be abandoned if disturbance is excessive.

Vegetation Management Projects:

1) Initiate vegetative treatment projects to improve bighorn habitat lost to natural succession or human impacts.
2) Cooperate with the BLM to utilize controlled burns and/or mechanical treatments to remove conifer encroachment on open hillsides to increase and improve bighorn habitat across the unit.
3) Promote "let it burn" policies with BLM on all wildfires in bighorn sheep habitat when human safety and human structures are not at risk.
4) Much of the bighorn habitat is found in Wilderness Study Areas and will be difficult to initiate active habitat management.
5) Identify specific habitat restoration projects to immediately benefit bighorn sheep.
    - Pinyon-juniper removal at Little Park and Lila Canyon

Water Management Projects:

5) Work with the BLM, and private landowners to locate and improve water sources across bighorn habitat.
6) Cooperatively modify or improve existing water developments and guzzlers for bighorns.
    - Elliot Mesa guzzler needs rebuilt
7) Install new water developments or guzzlers in bighorn habitat where water may be scarce or lacking.
    - Horse Bench

RECREATION MANAGEMENT

Recreation Management Objectives:

1) Provide hunting opportunities on the Nine Mile unit that are a quality experience.
2) Increase public awareness and expand viewing opportunities of bighorn sheep.

Recreation Management Strategies:

Hunting: Hunting and permit allocation recommendations will be made in accordance with the Utah Bighorn Sheep Statewide Management Plan. Ewe hunts may be utilized as a tool for maintaining population objective.

Harvest Statistics

Year	Permits	Mean Days Hunted	Harvest	Satisfaction
2004	4	9.0	100%	-
2005	4	14.0	100%	2.3
2006	7	9.4	86%	4.7
2007	7	4.7	100%	5.0
2008	10	10.1	100%	4.4
2009	9	13.0	100%	5.0
2010	13	7.3	100%	4.8
2011	12	8.6	100%	4.8
2012	17	5.2	100%	4.9
2013	17	6.2	100%	4.6
2014	17	4.9	100%	4.8
2015	16	6.8	100%	4.3
2016	16	4.3	100%	4.7
		Gray Canyon Subunit		
2017	7	4.6	100%	4.9
2018	8	8.8	100%	4.8
		Jack Creek Subunit		
2017	2	3.5	100%	4.5
2018	2	4.5	100%	5.0

Non-Consumptive Uses: The DWR will look for opportunities to increase public awareness and expand viewing opportunities of bighorn sheep through viewing events and public outreach. Significant viewing opportunities are available along the Hastings Road north of Green River.

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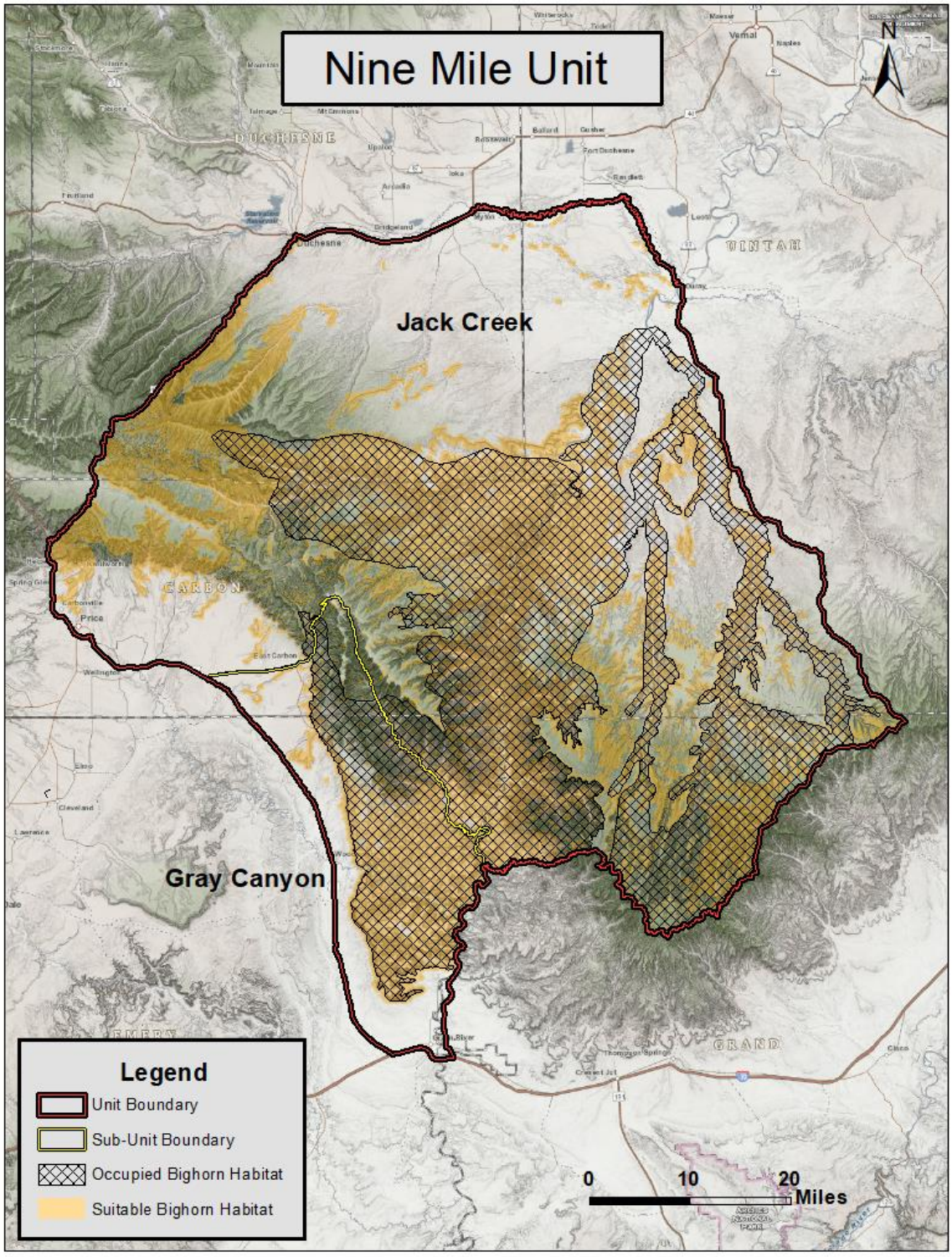

Figure 1. Nine Mile unit management boundary, modeled suitable bighorn sheep habitat, and currently occupied bighorn habitat.