| | |
|---|---|
| **SPECIES: Scientific [common]** | **Bighorn Sheep *(Ovis canadensis*)** |
| **Forest:** | **Ashley NF** |
| **Forest Reviewer:** | **Abeyta/Christensen** |
| **Date of Review:** | **12/2023** |
| **Forest concurrence (or recommendation if new) for inclusion of species on list of potential SCC: (Enter Yes or No)** | **No** |

**Forest review result:**

**The Forest concurs or recommends the species for inclusion on the list of potential SCC:**

Yes__ No _X_

Rationale for not concurring is based on (check all that apply):

Species is not native to the plan area _____

Species is not known to occur in the plan area _____

Species persistence in the plan area is not of substantial concern ___X___

**Species: ____Bighorn Sheep_____**

**FOREST REVIEW INFORMATION**

**Status summary based on other methods (information is on the Regional Office list of species considered; correct as needed):**

| Entity | Status/Rank (include definition if Other) |
|---|---|
| NatureServe | G4, N4 |
| Natural Heritage Program | |
| State List Status | Utah-S3; The species was removed from the state of Utah's list of Species of Greatest Conservation Need in 2021.<br>Wyoming - S2, however the species habitat does not occur on the Wyoming portion of the planning unit.<br>One state within the species core distribution ranks the species as a S1 (critically imperiled), five states rank it as a S2 (imperiled), two states as a S3 (vulnerable), one state as S3/S4 vulnerable/apparently secure, four states as a S4 (apparently secure), and two states as "unranked". |
| USDA Forest Service | Sensitive Species |
| USDI FWS | NA |
| Other | |

**Review of species of conservation concern criteria based on definition**

**1. Native to the plan area**

a. Is the species native to the plan area?

Yes _X_ No___

The species is native to Utah and the plan area, however, by the 1960's rocky mountain bighorn sheep were thought to be extirpated from the state of Utah and from the plan area (UDWR 2018, USDA Forest Service 2022). All bighorn sheep herds currently on the Ashley plan area are from reintroduction efforts that began in 1983 and from subsequent augmentation (UDWR 2018 and UDWR 2019a&b).

i. If no, provide explanation.

**Species: ___Bighorn Sheep_____**

**2. Known to occur in the plan area**

**Table 2. Known Occurrence Frequency within the Planning Area (NRIS database)**

| **Occurrence:** | Number | Source of Information |
|---|---|---|
| **Known Occurrences in the past 20 years** | numerous | UDWR 2018, UDWR 2019a&b, UDWR 2023a&b |
| **Year Last Observed** | 2023 | UDWR 2023a&b |

a. Are all species occurrences only accidental or transient?

Yes___ No _X_

b. Based on the number of observations and/or year of last observation, can the species be presumed to be established or becoming established in the plan area?

Yes _X_ No__

1) If no, provide explanation,

**3. Substantial concern for species persistence in the plan area**

a. Describe briefly the distribution, abundance, and population trend of the species in the plan area.

Bighorn sheep were extirpated from Utah, including the Ashley planning unit (UDWR 2018, UDWR 2019a&b, Shannon 2008, Dalton & Spillett 1971, Smith et. al. 1988, USDA Forest Service 2022). Reintroductions of bighorn sheep to the Ashley planning unit began in 1983 and have resulted in six herds that use the Ashley plan area (UDWR 2018, UDWR 2019a&b, Shannon 2008, Dalton & Spillett 1971, Smith et. al. 1988). These six herds consist of the Avintaquin herd which is located on the south unit of the Ashley plan area and five connective herds that occur in the Uinta mountains, which are located primarily on the northeast side of the Ashley plan area (UDWR 2018, UDWR 2019a&b, Shannon 2008, Dalton & Spillett 1971, Smith et. al. 1988). As such, all bighorn sheep herds that use the Ashley plan area are from these reintroductions (UDWR 2018, UDWR 2019a&b, Shannon 2008, Dalton & Spillett 1971, Smith et. al. 1988, Smith et. al. 1991). The five herds in the Uinta mountains are connective and comingle one with another (Shannon

2008, UDWR 2018, UDWR 2015c, UDWR 2019b). All six herds have fluctuated in numbers over time, with some herds experiencing periods of large increases and some periods of large decreases (Shannon 2008, UDWR 2015c, UDWR 2018, UDWR 2019b). However, since reintroduction efforts these bighorn sheep herds have substantially expanded their range beyond the original release sites (Shannon 2008, UDWR 2015c, UDWR 2018, UDWR 2019a&b).

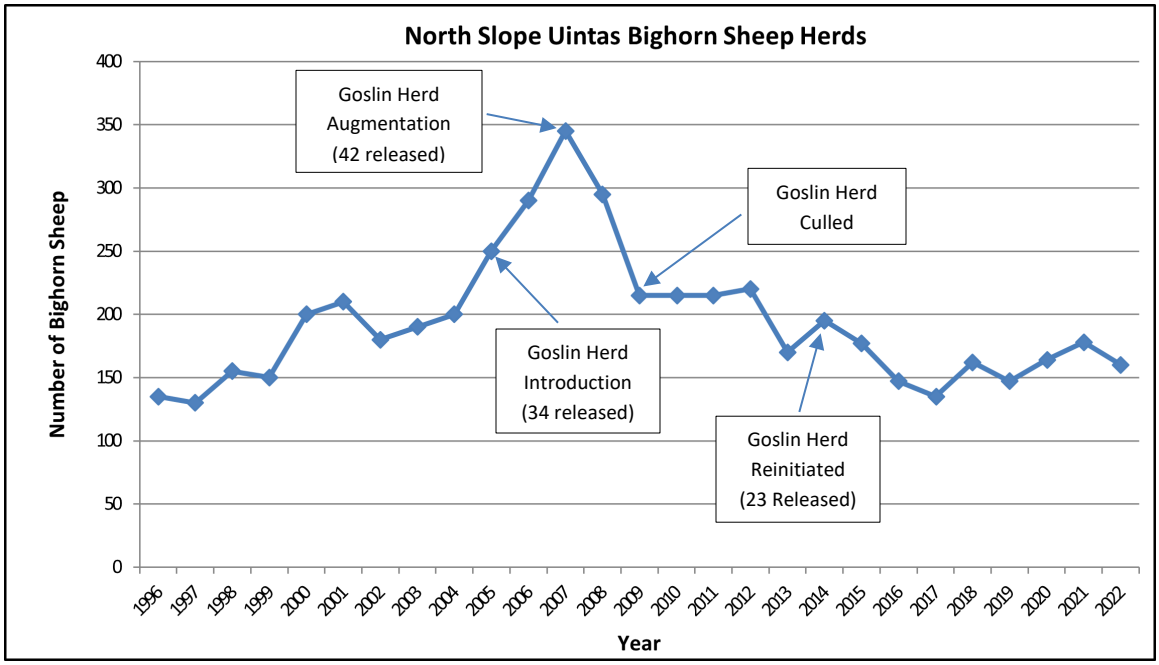
The Avintaquin herd was started in 2009 with 60 individuals and increased to 120-150 individuals by 2014 (UDWR 2018, UDWR 2019a). This herd experienced a respiratory disease die-off in 2015 and the herd estimate has remained stagnant since then around 30 individuals (UDWR 2019a, UDWR 2023a). There have been no augmentations to this herd since the herd was first introduced in 2009 (UDWR 2018, UDWR 2019a).

The five Uinta Mountains herds began with reintroducing the Bare Top herd in 1983, the Hoop Lake herd in 1989, the Sheep Creek herd in 1989, the Carter Creek/Red Canyon herd in 2000, and the Goslin Herd in 2005. However, the Goslin herd was culled in 2009 because of disease and then another reintroduction to Goslin occurred in 2014. Augmentations have not occurred within the Hoop Lake herd nor the Bare Top herd but have occurred within the other three herds. The last augmentation occurred in 2007 and occurred in the Goslin herd before the herd was culled in 2009. Prior to that, the last augmentation was in 2003. (Shannon et. al. 2008, McFarlane and Aoude 2010, Wild Sheep Working Group 2015, UDWR 2015c, UDWR 2015h, UDWR 2016c, UDWR 2016e, and UDWR 2018, UDWR 2019b, UDWR 2023d)

Since the initial reintroduction efforts in 1983, combined herd estimates of the five Uinta bighorn sheep herds have fluctuated but reached a high of 345 in 2007 (UDWR 2015h, UDWR 2016e, UDWR 2017, UDWR 2018, and UDWR 2018b, UDWR 2023d). The introduction (76 individuals) and growth of the Goslin herd contributed a large proportion to this growth and was the largest of the 5 herds in 2007 (125 individuals) (UDWR 2015h, UDWR 2016c, UDWR 2016e, UDWR 2017, and UDWR 2018, UDWR 2023d). However, disease in the Goslin herd was suspected in 2008, confirmed in 2009, and the herd was culled by the UDWR that same year (UDWR 2015h, UDWR 2016e, UDWR 2017, and UDWR 2018, UDWR 2023d). The elimination of the Goslin herd reduced the combined herd estimate to 215 bighorn sheep in 2009 (UDWR 2015h, UDWR 2016e, UDWR 2017, and UDWR 2018, UDWR 2023d). The combined herd estimate further declined to 170 in 2013 and bumped back up to 195 in 2014, due partially to the reinitiation of the Goslin herd, which occurred in 2014 with 23 (UDWR 2015h, UDWR 2016e, UDWR 2017, UDWR

2018, UDWR 2018b, UDWR 2019c, UDWR 2020b, UDWR 2021b, UDWR 2023a&d). The combined herd estimates have slightly fluctuated since 2014 with a low estimate of 135 in 2017 and a high estimate of 178 in 2021, and a current estimate of 160 for 2022 (UDWR 2015h, UDWR 2016e, UDWR 2017, UDWR 2018, UDWR 2018b, UDWR 2019c, UDWR 2020b, UDWR 2021b, UDWR 2023a&d). Although, the combined herd estimates have fluctuated over the years, it appears that the Uinta's bighorn sheep numbers have somewhat stabilized over recent years (Table 1 below).

**Table 1:** Uinta Bighorn Sheep combined herd estimates from 1996-2022. Based on yearly herd estimates. (UDWR 2016a, UDWR 2015h, UDWR 2016d, UDWR 2016e, UDWR 2017, UDWR 2018, UDWR 2018b, UDWR 2019c, UDWR 2020b, UDWR 2021b, UDWR 2023a&d)




Estimates of minimum viable population (MVPE) specific to bighorn sheep range from 50 to 400 individuals, with most estimates ranging from 125-250 individuals (Geist 1975, Sands 1976, Van Dyke et. al. 1983, Berger 1990, Smith Flinders & Winn 1991, Fitzsimmons and Buskirk 1992, Krausman et. al. 1996, Valdez & Krausman 1999, Wehausen 1999, Singer et. al. 2000b, Singer et. al. 2001, Shannon et. al. 2008, Cassaigne et. al. 2010, UDWR 2015c, UDWR 2016f, and UDWR 2018). The State's 2018 State-wide Bighorn Sheep Management Plan does not specify a MVPE, but rather provides direction to maintain a state-wide sustainable population (UDWR 2018). Geist (1975) and others (Sands 1976, Van Dyke et al. 1983, Smith 1991, Shannon et. al. 2008) have suggested that wildlife managers should maintain populations of at least 125 individuals if the populations are to survive. Thus, it appears from the literature that bighorn

sheep populations that comprise between 125-250 individuals are likely maintainable for the long-term (50-100 years).

b. Describe briefly threats or risk factors to the species or the ecological conditions that support it (i.e. habitat) based on available scientific information,

Habitat

Bighorn sheep prefer open habitat types (high alpine to lower grasslands) with adjacent steep rocky areas for escape and safety (UDWR 2018, UDWR 2019a&b, NatureServe 2023). Habitat is characterized by rugged terrain including canyons, gulches, talus cliffs, steep slopes, mountaintops, and river benches (UDWR 2018, UDWR 2019a&b, NatureServe 2023). Sheep habitat in North America is highly varied but is characterized by an open landscape and stable plant communities in which grasses predominate (UDWR 2018, UDWR 2019a&b, NatureServe 2023). Bighorn sheep habitat on the Ashley plan area can be found at the higher elevations of the Uinta Mountains and the Avintaquin area, and these habitat conditions are generally in satisfactory condition UDWR 2015e, UDWR 2019a&b).

Threats/Risks

Threats to the species are primarily disease and predation from mountain lions (UDWR 2018, UDWR 2019a&b, NatureServe 2023). Other possible threats to the species include forage competition from domestic livestock, habitat loss from human disturbance and natural succession, and over-hunting (UDWR 2018, UDWR 2019a&b, NatureServe 2023). However, the Utah Division of Wildlife Resources has determined that these other threats have little effect to bighorn sheep that use the Ashley plan area and thus focus management on the two primary threats (mountain lion predation and disease). (NatureServe 2017 and 2023, UDWR 2018, UDWR 2019a&b) For example, it appears that bighorn sheep may be somewhat tolerant of recreation and human disturbance (Papouchis et al. 2001; MacArthur et al. 1982; Longshore et al. 2013; Wiedmann and Bleich 2014; Toweill and Geist 1999). For instance, bighorn sheep consistently use areas along Highway 191, Forest Service roads, and campgrounds near Flaming Gorge, and they exhibit undisturbed behavior. Likewise, the Utah Division of Wildlife Resources unit management plan for bighorn sheep in this area indicates that bighorn sheep in the area are not disturbed by recreational activities (UDWR 2019a&b).

Mountain lion predation on bighorn sheep on the Ashley planning unit has been found to substantially decrease bighorn sheep numbers in these herds, and the Utah Division of Wildlife Resources actively manages mountain lion numbers, in part, for the protection of bighorn sheep. (UDWR 2018, UDWR 2019a&b)

Respiratory disease (bacterial pneumonia) outbreaks in bighorn sheep populations can result in a substantial immediate die-off (Besser et. al. 2012a, Besser et.al. 2012b). The bacteria, *Mycoplasma ovipneumonia,* has been associated with bacterial pneumonia and has now been found to be a key pathogen that plays a primary role in epizootic pneumonia in bighorn sheep resulting in population die-offs (Besser et. al. 2012, Besser et. al. 2012b, Besser et. al. 2014). All six bighorn sheep herds that use habitat on the Ashley plan area have tested positive with *Mycoplasma ovipneumonia* and have experienced periodic die-offs followed by periodic increases in numbers (UDWR 2018 and UDWR 2019a&b). Based on past history of these herds, disease events may happen at 5-10 year intervals and die-offs may result in 30-50% mortality before rebounding through recruitment or augmentation (UDWR 2013c, 2015b, 2016a, 2016c, 2016d, 2016e, 2017, 2018, 2018b, 2019c, USDA Forest Service 2015).

Pathogens that cause bacterial pneumonia in bighorn sheep can be transmitted from domestic sheep to bighorn sheep and possibly from other species such as mountain goats (UDWR 2018, UDWR 2019c). Mountain goats may carry pathogens that cause respiratory disease in bighorn sheep (Highland et al. 2018; Wolff et. al. 2016; Wolff 2018) and often overlap bighorn sheep habitat in high, rugged terrain, such as the Uintas Mountains. A study in Nevada found that mountain goats may have been a carrier of pathogens that caused a pneumonia outbreak in bighorn sheep in the same area (Wolff et. al. 2016; Wolff 2018). A mountain goat harvested in 2018 was the first mountain goat to test positive with *Mycoplasma ovipneumonia* in the Uinta mountains and the prevalence of the pathogen in the mountain goat herds in the Uinta mountains is uncertain (UDWR 2019b). However, the likelihood of bighorn sheep contact with other species such as mountain goats and the potential for pathogen transmission between mountain goats and bighorn sheep on the Ashley National Forest are uncertain (UDWR 2019b).

Lands with domestic sheep use that overlap a bighorn sheep core herd home range (geographic area typically used by bighorn sheep) may pose some level of risk to bighorn sheep (UDWR 2018, UDWR 2019a&b, Ashley NF 2021). There is one domestic sheep allotment on the Ashley plan area that overlaps the very western edge of the Uinta's bighorn sheep core herd home range (CHHR), and no allotments on the Ashley plan area overlap the Anvintaquin CHHR (USDA Forest Service 2015 and Ashley NF 2021). There is also one domestic sheep allotment on BLM and six private land mile sections that overlap the same CHHR used by these bighorn sheep (Ashley NF 2021). This presents a relatively high risk of contact (ROC) between bighorn sheep and domestic sheep on all three land ownerships (Ashley NF 2021). If domestic sheep were removed only from allotments on the Ashley plan area that overlap bighorn sheep areas, there would still be lands (BLM and private) with domestic sheep use that overlap a bighorn sheep CHHR, which would still result in a high ROC (Ashley NF 2021). Additionally, Sells et. al. concluded that the risk of pneumonia epizootics in bighorn sheep increased in relation to private land (Sells et. al. 2015). Heinse et al. also documented the threat of pathogen spillover to bighorn sheep from domestic sheep on private lands (Heinse et al. 2016). It is evident that to effectively remove the high ROC, domestic sheep would need to be removed from all lands (Ashley plan area, BLM, and private) that overlap the CHHR (Ashley NF 2021).

It appears that these bighorn sheep herds have been somewhat resilient over the course of their existence to disease (UDWR 2015h, UDWR 2016e, UDWR 2017, UDWR 2018, UDWR 2018b&c, UDWR 2019b&c, UDWR 2020b, UDWR 2021b, UDWR 2023a&d, Ashley NF 2021). Bighorn sheep on the Ashley plan area have been maintained for 40 years, and have done so in the presence of disease for the last 30+ years, which indicates these herds have been somewhat resilient to disease (UDWR 2018c, UDWR 2019b, Ashley NF 2021). However, this may be due, in part, to the various management strategies employed by the Utah Division of Wildlife Resources (UDWR) in managing these herds and minimizing risks to the species (UDWR 2018c, UDWR 2019b, Ashley NF 2021). Collaboration between the UDWR and the Ashley NF has contributed to the implementation of many of these strategies (UDWR 2018c, UDWR 2019b, Ashley NF 2021). Currently, there is one statewide memorandum of understanding and one site-specific memorandum of understanding between the State of Utah and the Forest Service, which are being utilized in management of bighorn sheep on the Ashley National Forest

to help minimize the risk of contact between domestic sheep and bighorn sheep (USDA Forest Service 2019 and 2022).

c. Considering the trend in populations or habitat and threats or risk factors for those populations or habitats, is there substantial concern for persistence of the species in the plan area?

Yes___ No _X_

1) If no, provide explanation:

Concern for the species in the Ashley plan area is not substantial because of the following reasons:

- This species is “apparently secure” (G4) globally and nationally (N4), and thus is not a concern globally or nationally (NatureServe 2023).
- The species is ranked “vulnerable” (S3) in Utah (Nature Serve 2023) indicating there could be some concern in the state for the species. However, in 2021 the state of Utah removed bighorn sheep from the states list of Species of Greatest Conservation Need indicating that concern for the species in the state is low (Utah 2021).
- The species is ranked a “imperiled” (S2) in Wyoming (NatureServe 2023), however there is no habitat for the species on the Wyoming portion of the Ashley planning unit. Thus, there is no concern for the species on the Wyoming portion of the Ashley planning unit.
- Bighorn sheep on the Ashley plan area have substantially expanded their range beyond the original release sites.
- Overlap of the Ashley plan area domestic sheep allotment and the CHHR only occurs on the very western edge of the CHHR, and the vast majority of Uintas bighorn sheep (Bare Top herd, Goslin herd, Red Canyon herd, and nearly all of the Sheep Creek herd) are located toward the eastern side of the CHHR and do not foray to the west where the overlapping Forest Service domestic sheep allotment is located (Ashley NF 2021). Thus, the high ROC to the domestic sheep allotment on the Ashley plan area only occurs on the very western edge of the CHHR with a limited number of bighorn sheep, primarily from the Hoop Lake herd.
- Of the six bighorn sheep herds that use the Ashley plan area, the Hoop Lake bighorn sheep herd has the greatest risk of contact with domestic sheep on the Ashley plan area, has not received any augmentation since its introduction in 1989, and the herd estimate has been approximately 15 to 20 individuals depending upon the year.

- Nearly 40 years of empirical evidence suggests that while disease has affected the bighorn sheep herds on the Ashley plan area, current management by the UDWR has resulted in the maintenance of bighorn sheep in the Ashley plan area (UDWR 2019a,b,&c, UDWR 2018, and UDWR 2018b&c, UDWR 2023).
- Even if there were no domestic sheep on the Ashley plan area, there would still be a high ROC from other lands with domestic sheep use (BLM and private) (Ashley NF 2021).
- An April 27, 2018 letter from the UDWR informed the Forest Service that the Uintas bighorn sheep have co-existed with domestic sheep in proximity to their occupied habitat for nearly 30 years, that the UDWR has successfully managed sustainable herds of bighorn sheep in the Uintas during that time, and that should concerns arise in the future the UDWR will actively manage these bighorn sheep (consistent with UDWR's approved bighorn sheep management plan) to mitigate potential risks (UDWR 2018c).
- The 2022 MOU between the UDWR, UDAF, Forest Service, and the Permittees identifies strategies (some of which are a continuation of past collaborative actions) to minimize the risk of comingling between domestic sheep and bighorn sheep, which will contribute to the maintenance of bighorn sheep in the Ashley plan area (USDA Forest Service 2022).
- Although the number of individuals in bighorn sheep herds on the Ashley Plan area have fluctuated over time, and are subject to periodic disease episodes, the 2022 combined Uintas herd estimate of 160 individuals is within the range of MVPE (125-250 individuals). Likewise, the combined Uintas herd estimate has stayed within this range of MVPE since 1996 (nearly 30 years).
- Although, the combined Uintas bighorn sheep herd estimate has fluctuated, the State still considers these herds viable enough to sustain an annual harvest and offered another 5 ram permits in 2022 and another 5 permits in 2023. The harvest of over 100 rams (104 rams) from 1993 through 2021 suggests that these herds are sustainable enough to withstand a loss of this many rams through harvest, even during periodic disease outbreaks. (UDWR 2019b, UDWR 2019c, UDWR 2020c, UDWR 2022, UDWR 2023c)
- Bighorn sheep habitat on the Ashley plan area does not appear to be a limiting factor (UDWR 2015e, UDWR 2019a&b).
- The UDWR continues to aggressively manage mountain lions to reduce mountain lion predation on bighorn sheep (UDWR 2019a&b).
- Threats such as forage competition from domestic livestock, habitat loss from human disturbance and natural succession, and over-hunting do not appear to be a concern to bighorn sheep on the Ashley plan area (UDWR 2019a&b)

In addition to the April 27 2018 letter, the UDWR also states the following in their 2018 State-wide Bighorn Sheep Management Plan (UDWR 2018): "Because of the unique mosaic of bighorn sheep habitat in Utah and its pervasive proximity to domestic sheep

and goats on private and public lands, and the susceptibility of bighorn sheep to diseases harbored by domestic sheep and goats, it is impossible to completely remove all risk of pathogen transmission. UDWR fully understands and accepts the risks of disease in bighorn sheep populations, and will employ a variety of strategies to manage around this risk to ensure sustainable populations of bighorns can exist in balance with domestic sheep grazing." Thus, considering this and the rationale provided above, these bighorn sheep are likely to be maintained through the various management strategies and techniques employed by the UDWR, including periodic augmentation as well as strategies to minimize risk of comingling between bighorn sheep and domestic sheep.

Bighorn sheep distribution map (2012) -

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