

Teton Range Bighorn Sheep Herd Situation Assessment

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Photo: A. Courtemanch

Compiled by:
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EXECUTIVE SUMMARY

Introduction and Overview

The Teton Range bighorn sheep working group (hereafter working group), comprised of wildlife biologists from the land and wildlife management agencies (Bridger-Teton National Forest, Caribou-Targhee National Forest, Grand Teton National Park, and Wyoming Game and Fish Department) responsible for the management of the bighorn sheep population and their habitat and several other non-agency biologists with a long history of working with the Teton Range bighorn sheep population has been working together for close to 30 years to conserve the Teton Range bighorn sheep population. Over the last several years the working group has become increasingly concerned about the status of the Teton Range bighorn sheep population and its long-term prospects for persistence. The working group considers the population to be at a breaking point where the management agencies must take conservation actions soon or risk losing the population. To this end, the working group recently undertook two initiatives aimed at obtaining technical input on current research and management and assessing the perspective of the local winter backcountry community with respect to bighorn sheep and winter backcountry recreation. These efforts included: 1) convening an expert panel to review and provide feedback on current management, research, and issues facing the bighorn sheep population, and 2) and an outreach effort to build awareness of and support for the Teton Range bighorn sheep population and obtain feedback from the public.

This document summarizes the bighorn sheep data and information compiled for the expert panel review, the discussion between the expert panel members and the bighorn sheep managers, the recommendations made by the panel, and the key messages that emerged from conversations with community members.

Assessment Process

In March of 2019, the working group convened a panel of scientists with expertise in various aspects of bighorn sheep ecology, disease, demography, genetics, habitat/nutrition, or management. In preparation for the panel discussion, the working group compiled a document that summarized the current state of knowledge for the Teton Range bighorn sheep population and provided the document to the expert panel for review prior to their arrival. The panel of technical experts met with the management agencies for a full day and in the evening participated in a public meeting sharing information from the daytime session.

In a separate effort, members of the working group met with community members one-on-one or in small groups for “coffee-cup” conversations over the past two years. These conversations were designed to:

- inform participants about the status of the Teton Range bighorn sheep population and the concerns about impacts to sheep from backcountry winter recreation to build community awareness; and
- learn the perspectives of community members and assess general willingness to participate in a broader community engagement process around this issue.

The goal of these conversations was to share information about the status of the Teton Range bighorn sheep population and to listen to the perspectives, opinions, and concerns of the public about the issue and ideas about possible solutions.

Key Findings: Research Summary and Expert Panel

The information provided to the expert panel for review is summarized later in this document. The panel, consisting of nationally recognized experts in ecology, demographics, genetics, habitat, nutrition, and management of bighorn sheep and epidemiology of wildlife diseases and etiology of pneumonia in bighorn sheep, offered a number of recommendations related to the specific issues facing the Teton Range bighorn sheep population. Below is a condensed summary of the action items the expert panel suggested that the agencies consider based on their review of population data/information and discussion with the managers:

General

- Focus on preserving the existing bighorn sheep population and occupied habitat and actively manage the threats. Identify items the working group can address positively in the near term.

Habitat and Nutrition

- Enhance population and health monitoring. Specifically, assess nutritional status of the population (consider early winter captures to assess body condition or a study to assess forage quality).
- Work with fire management personnel to identify wildland and prescribed fire opportunities to restore important bighorn sheep habitats.
- Actively manage (remove) mountain goats to minimize impacts to bighorn sheep.
- Consider the cumulative effects of climate change on winter mortality and quality of summer habitats.

Limited Winter Range

- Coordinate with appropriate resource specialists to restore fire to the landscape.
- Reduce human disturbance on crucial bighorn sheep winter ranges.

Domestic Sheep Grazing

- Conduct a disease risk assessment (specific to hobby sheep/goat flocks).

Disease

- Prevent transmission of respiratory pathogens from mountain goats and neighboring bighorn sheep herds.
- Address the risk of pathogen transmission from pack goats.
- Actively manage (remove) mountain goats to minimize impacts to bighorn sheep.
- Continue disease surveillance efforts.
- Consider collaring young bighorn sheep rams to understand movements and potential for exposure to pneumonia pathogens.

Hunting

- Consider closing the bighorn sheep hunt in the Teton Range. Identify trigger points for when hunt should occur.

Demographics

- Enhance population monitoring. Several specific suggestions for tools or techniques were offered, including population estimation using mark-resight or genetic capture-recapture, intensive lamb surveys to monitor survival and recruitment, and recount from photos during aerial surveys.

Genetics

- Reassess the genetic status of the Teton Range bighorn sheep population.

- Identify trigger points for when intensive management actions [e.g. moving pregnant females or young males, augmentation with other sheep (not currently recommended)], would be necessary to address genetic concerns.

Predation/Mortality

- Continue to monitor mortality causes.

Key Findings: Community Outreach Efforts

Over the last 2 years, members of the working group met one-on-one or in small groups with community members interested in the issue surrounding Teton Range bighorn sheep and backcountry winter recreation. Below are some key themes and thoughts that emerged from those discussions.

- There is a lot of community interest in this topic/issue.
- Backcountry winter recreation, especially skiing, is very important to the local community and has a long and rich history here.
- Most people were supportive of working with the agencies to identify possible solutions to this issue.
- Many people were not aware of the issue or thought that the community as a whole may not be aware that the bighorn sheep population is struggling.
- There is concern about losing access and freedom and winter backcountry users feel they are singled out.
- Some thought that wildlife managers are moving too slow.
- Community members had ideas for solutions that they wanted to share.
- Community members expressed concern for the bighorn sheep population and wanted to be part of the process to address the issue.

Action Items

Based on the feedback from the expert panel and our community conversations, the working group identified several actions to advance conservation of the Teton Range bighorn sheep population:

1. Expert Panel - Expert Panel - In the short term, move forward with high priority expert panel identified actions, strategies, or recommendations including mountain goat removal, engaging the public to address human disturbance on bighorn sheep winter ranges, and enhancing the quality of demographic data collection. In the longer-term, update the Teton Range bighorn sheep working group strategic plan to incorporate new data and information and the expert panel recommendations. In the longer-term, update the Teton Range bighorn sheep working group strategic plan to incorporate new data and information and the expert panel recommendations.
2. Community Conversation - Engage the public in a collaborative learning process specially focused on the issue of backcountry winter recreation and Teton Range bighorn sheep. This process is not intended to be a decision making (or NEPA) process but rather a series of public workshops where the public and agency managers learn from each other about the issue and collaboratively develop possible solutions to reduce impacts on bighorn sheep

from backcountry winter recreation. Key elements of the process include the following: open to all, shared learning, transparent, and collaborative development of community-supported possible solutions that meet agency policies.

INTRODUCTION AND BACKGROUND

Purpose of this Assessment

This Situation Assessment is intended to summarize the results of two initiatives undertaken by the Teton Range bighorn sheep working group to obtain technical input from a committee of scientists with expertise in bighorn sheep management and research and an effort to better understand perceptions of local residents regarding the bighorn sheep population and the issue around backcountry winter recreation.

Background

Bighorn sheep have occupied the Teton Mountain Range for thousands of years, but today this native population is small and at risk of local extinction. The Teton Range bighorn sheep population ranges within Grand Teton National Park (GRTE) on the east slope and the Caribou-Targhee (CTNF) and Bridger-Teton National Forests (BTNF) on the west slope. Management of the herd and its habitat is coordinated between the National Park Service, Wyoming Game and Fish Department (WGFD), and the US Forest Service. The sheep are considered a core native herd by the State of Wyoming, which means they have never been extirpated or augmented with transplanted sheep. WGFD also considers bighorn sheep as a Species of Greatest Conservation Need. Bighorn sheep are designated a sensitive species on the BTNF and the Targhee portion of the CTNF. Sensitive species are those for which population viability is a concern. These species are given special management emphasis.

With concern for the sustainability of the Teton Range's bighorn sheep population, the Teton Range Bighorn Sheep working group was formed in the early-1990s and includes biologists from GRTE, WGFD, BTNF, CTNF as well as several local sheep experts. In 1996, the working group finalized a strategic plan to address threats to population survival. Since then, significant research and field work led by the GRTE and WGFD has addressed many of the identified threats, but much more work remains to be done to ensure the persistence of this iconic bighorn sheep population.

ASSESSMENT APPROACH

PART 1: Research Summary and Expert Panel

In March 2019, the working group convened a panel of scientists from around the western United States with expertise in the ecology, demographics, genetics, habitat, nutrition, and management of bighorn sheep and epidemiology of wildlife diseases and etiology of pneumonia in bighorn sheep. The working group provided the expert panel with a Teton Range Bighorn Sheep Research Summary as background and asked them to do the following:

- Review existing research, state of knowledge, current management strategies and conservation initiatives of the herd;
- Identify critical data gaps in need of attention/improvement;
- Recommend and prioritize management/conservation actions, research and other strategies to improve population resilience; and
- Share expertise and thoughts with the public through a panel discussion.

The expert panel members included:

Dr. Tom Besser – Professor, Department of Veterinary Microbiology and Pathology, Washington State University
Dr. Clinton Epps – Associate Professor in Mammalian Ecology and Population Genetics, Oregon State University
Dr. Bob Garrott – Professor, Department of Ecology, Montana State University
Dr. Tom Lohuis – Regional Research Coordinator, Alaska Department of Fish and Game
Hollie Miyasaki – Staff Biologist, Idaho Department of Fish and Game
Dr. Tom Stephenson – Sierra Nevada Bighorn Sheep Recovery Coordinator, California Department of Fish and Wildlife
Dr. Peri Wolff – Wildlife Veterinarian, Nevada Department of Wildlife

In preparation for the expert panel, the working group summarized the state of knowledge and current situation for the Teton Range bighorn sheep population and provided this background document and relevant papers and reports to the panel for review prior to meeting. The working group met with the expert panel for a full day and discussed a range of topics. In the evening, the expert panel attended a public meeting and discussed the results of the daylong session with the managers and the recommended action items for the bighorn sheep population. The background material for each major topic followed by a summary of the expert panel discussion and recommendations is below.

Key Findings: Research Summary and Expert Panel

Herd History and Distribution

Background - Through extensive review of archaeological, historical, and agency records and many interviews with long-time residents of nearby valleys, Whitfield (1983) developed a historical perspective of bighorn sheep in the Teton Range. Bighorn sheep and aboriginal humans interacted in the Tetons for over 6,000 years. Early Euro-American visitors to the region found bighorn sheep to be numerous and widely distributed in areas in and around the Tetons. Given abundant high quality summer range in the Tetons and access to lower elevation winter ranges, the Teton Range bighorn sheep population was likely much larger than it is today. Human activities post settlement in nearby mountain valleys greatly reduced bighorn sheep numbers, altered distributions and reduced habitat quality. Migration routes to lower elevation winter ranges, some of which were likely at some distance from the Tetons, were lost. Extirpation of bighorn sheep populations from the adjoining Snake River and Big Hole ranges and a break in connections to the Gros Ventre population led to genetic isolation of Teton sheep by the mid-1900s. Major stressors to the Teton bighorn sheep were domestic livestock grazing and associated diseases, excessive hunting, loss of seasonal migrations and winter ranges, loss of genetic connectivity with other bighorn sheep populations, and curtailment of natural wildfire.

Whitfield (1983) documented the current distribution of bighorn sheep in the Tetons through direct field observation and annotation of agency observation records. Cain and Reid (1997), and Courtemanch (2014) substantiated and refined these seasonal distributions through radio telemetry and GPS-collar data. Further, Courtemanch (2014) confirmed bighorn sheep were using areas in the southern end of the Tetons that were not known to be occupied in recent times. Today's Teton Range bighorn sheep are grouped into two subpopulations in the northern

Tetons and southern Tetons, with few sheep seen in the central Tetons. Teton bighorn sheep are generally found at or near tree-line in all seasons but spring when most sheep descend to low elevations to follow green-up and fall when sheep descend to mid-elevations during the rut. Most winter ranges are found on isolated patches of windswept alpine tundra or snow free krummholz ridges at high elevation. Teton Range bighorn sheep primarily winter at high elevations where conditions are harsh and food is scarce. Avalanches have been found to be an important mortality source for Teton Range bighorn sheep (Cain and Reid 1997, Courtemanch 2014).

Expert Discussion - The Teton Range sheep population has not changed dramatically since the 1970s-1980s, although there appears to have been a decline in numbers in the past few years. Over that time winter closures on some of the most significant winter ranges, elimination of domestic sheep grazing throughout the Tetons, and small scale prescribed burns may have contributed to sustaining the population, but it does appear to be on the edge. The Teton herd is a native population that has adapted to wintering at high elevation and is regarded as of high value as an iconic symbol of a resilient, genetically unique population. The relevant agencies are committed to sustaining this sensitive and vulnerable population. Although there is some interest in re-establishment of some of the pre-settlement migration routes used by Teton Range bighorn sheep, there are currently substantial risks associated with such movements, most notably exposure to disease and conflict with human activity and other wildlife populations.

Recommendations:

- Focus first on preserving the population and occupied habitat and actively manage the threats.
- Identify items the working group can address positively in the near term.

Habitat and Nutrition

Background - The Teton Range bighorn sheep appear to have ample high quality summer forage. Bighorn sheep summer ranges in the Tetons are characterized by notably abundant and diverse forb species (Whitfield 1983) which provide bighorn sheep with high quality forage (Courtemanch 2014). By contrast, winter ranges are severely limited.

Expert Discussion - The experts suggested there needs to be better population health and habitat monitoring in all seasons.

Recommendations:

- Enhance population and health monitoring
 - Consider assessing body condition using remote cameras or other methods in conjunction with continued captures;
 - Consider placing remote cameras on winter range to monitor sheep and public interaction/effectiveness of outreach;
 - The condition of bighorn sheep going into winter is not well understood. Fall captures of a small number of bighorn sheep to assess body condition could provide the best measure of summer nutrition and an index of summer range condition.

- Place greater emphasis on monitoring lamb survival and recruitment, particularly during bottleneck periods (e.g. winter starvation). Concentrated lamb surveys in the spring and fall could address this.
- Assess the impact of research captures on bighorn sheep.
- Cooperate and coordinate with federal fire personnel and land managers to identify and implement management action (e.g. prescribed fire, wildland fire use) to enhance bighorn sheep ranges and migration habitats, where possible and appropriate.
- Consider a summertime nutritional study to understand how quality of summer range affects the sheep herd or alternately conduct captures earlier (i.e. October) to assess nutritional condition and track summer range quality. Quality of summer range is particularly important for sheep that winter in high elevations and depend upon stored body fat.

Limited Winter Range - Access to Lower Elevation Winter Ranges

Background - Winter habitat is a limiting factor for this population. Human development and disturbances/pressures in the valleys flanking the Tetons isolated the herd from traditional low-elevation winter range and from neighboring sheep herds (Whitfield 1983). Long-term fire suppression has also affected habitat quality and blocked access to some low elevation winter ranges. After migration to low elevation winter ranges ceased in the early to mid-1900s, most sheep within the herd spend the winter at high elevation (9,000-11,000 feet) on windswept ridgelines and slopes in the Teton Range. Occupied winter habitat occurs in relatively small, disconnected patches and it is difficult for sheep to move between patches due to canyons and deep snow (Cain and Reid 1997, Courtemanch 2014).

In general, we suspect that these sheep have access to relatively low quality winter habitat that results in inadequate winter nutrition, which could limit reproduction or survival. Although we have not measured it directly, we believe that high quality summer forage and ample habitat allows sheep to successfully gain enough body fat to support lambs and go into the winter with enough fat reserves to survive in very limited winter habitat.

Expert Discussion - The experts discussed the potential of reestablishing bighorn sheep use of the historic low elevation winter ranges that are still deemed suitable habitat. Two scenarios were discussed, 1) prescribed burning to open up historical winter ranges or 2) try to reestablish longer range migrations into Jackson Hole and Idaho. Prescribed burns have been attempted without great success on the west slope, CTNF. Reestablishment of migration patterns would likely require larger catastrophic fires originating at lower elevation and moving into summer habitats. Longer migrations into Idaho are problematic due to disease risks and competition with other wildlife populations.

It appears that Teton Range bighorn sheep are enduring the winter by limiting their movements on high elevation winter ranges. As such, these sheep should not be disturbed in these habitats.

Recommendations

- Work with appropriate specialists (e.g. social scientist, fire ecologist, silviculturalist, recreation staff, etc.) to identify areas and develop a mechanism to allow for natural fire

ignitions in bighorn sheep habitat. Consider the use of prescribed fire to improve winter range conditions, where appropriate.

- Reduce human disturbance on crucial bighorn sheep winter ranges.

Domestic Sheep Grazing

Background - Whitfield (1983) reviewed numerous historical records to document domestic sheep grazing in the Tetons. During the late 1800's and early 1900's, large numbers of domestic sheep grazed throughout the entire Teton Range. Prior to establishment of Forest Reserves and subsequent National Forests to only later be followed by the funds needed to administer them, domestic sheep herds from as far away as Utah were trailed to the Tetons in an unregulated summer long race to exploit forage resources. Even after grazing control began to be administered around 1910, Forest Service allotment records indicate that over 25,000 permitted sheep still grazed the west slope of the Tetons between Coal Creek and Bitch Creek throughout the summer. Domestic herds often grazed in Teton Range bighorn sheep habitat. Significant damage to vegetation and subsequent soil erosion, direct disturbance to wild sheep from herders and dogs, and introduction of diseases likely led to severe declines in the bighorn sheep population. Gradually domestic herd reductions and administrative closures of bighorn sheep habitats reduced these impacts. The revision of the CTNF Forest Plan (1997) set goals to maintain and enhance the integrity of wild sheep habitats. Efforts to separate domestic sheep from bighorn sheep culminated in the voluntary buyout of grazing rights of the remaining domestic sheep grazing allotments on the west slope by the Wyoming Wild Sheep Foundation (WY-WSF, previously WY FNAWS) and the National Wildlife Federation (NWF) from 2001-2003. CTNF subsequently closed domestic sheep allotments, and the remaining domestic grazing in the CTNF is by cattle.

Expert Discussion - Domestic sheep in the general region remain as a potential source of disease transmission to bighorn sheep. The visiting experts asked if private land farms with domestic sheep and goats in the area had been fully assessed, and what the potential impact of these operations might be to Teton Range bighorn sheep. It was noted that there are a few small domestic sheep operations on private lands adjacent to the west slope of the Tetons, and that there is still domestic sheep grazing on Forest Service allotments in the Snake River Range where the likely source mountain goat population is found (GRTE unpublished data). Bighorn sheep are occasionally seen in the Snake River Range as well. Domestic sheep also still graze under permit in the Big Hole Mountains.

Recommendations.

- Conduct a disease risk assessment for areas around the Tetons with specific focus on domestic herds (e.g. hobby flocks) on private lands bordering the Tetons and those grazing in adjacent mountain ranges.

Disease

Background - There have been no confirmed disease die-offs in the Teton Range bighorn sheep population, although precipitous declines of Teton Range bighorn population by the early 1900s suggest die-offs may have occurred. Whitfield (1983) recorded an old-timer's observation of the remains of many bighorn sheep south of Rendezvous Mountain in the 1940s. Pneumonia is the

disease of most concern for bighorn sheep and the primary pathogens associated with it include several species of bacteria in the *Pasteurella* family and *Mycoplasma ovipneumoniae*. In recent study (Butler et al. 2018, GRTE unpublished data), a total of 20 animals were tested for *Mycoplasma ovipneumoniae* and *Pasteurellas* (nasal and tonsil swabs collected) using the Wyoming Game and Fish Wildlife Health Lab (6 animals January 2017, 12 animals December 2017, 2 animals December 2018). Samples were tested using a combination of culture and PCR. Leukotoxigenic bacteria in the *Mannheimia* genus (unidentified species that are not *M. haemolytica* or *M. glucosida*) were detected in 11 of the 20 animals and *Pasteurella multocida* was detected in one (1) of the 20 animals. *Mycoplasma ovipneumoniae*, *Mannheimia haemolytica*, *Mannheimia glucosida*, and leukotoxigenic *Bibersteinia trehalosi* were not detected. However, *Mannheimia haemolytica* was detected in Teton Range bighorn sheep in 2008 (Courtemanch 2014)

Mountain goats in the Teton Range are known to carry several *Pasteurella* species associated with polymicrobial pneumonia die-offs although the 14 sampled animals tested negative for *Mycoplasma ovipneumoniae* (a key component of polymicrobial pneumonia). The likely source population of mountain goats in the Teton Range, the Palisades/Snake River Range population, carry *Mycoplasma ovipneumoniae* and the *Pasteurella* species associated with pneumonia (Lowrey et al. 2018). Given the small number of mountain goats sampled in the Tetons and the pathogens carried by their likely source population, those pathogens that have yet to be detected in the Tetons may very well be present. Recent studies have documented the two-way transmission of pneumonia pathogens, with corresponding disease die-offs, between overlapping bighorn sheep and mountain goat populations (Wolff et al 2019).

Expert Discussion – The best available information does not indicate that the Teton Range bighorn sheep are currently facing notable disease issues. Nevertheless, a threat of pathogen transmission from neighboring bighorn sheep or mountain goat populations exists. Domestic sheep generally represent a reservoir of very high disease threat to bighorn sheep.

Recommendations:

- Prevent respiratory disease transmission to Teton Range bighorn sheep, with particular reference to keeping bighorn sheep for the Jackson herd and Snake River Range mountain goats from coming to the Tetons.
- Remove mountain goats from the Teton Range.
- Develop mechanisms to remove newly arrived mountain goats in the Tetons quickly.
- Conduct a disease risk assessment for areas around the Tetons with specific focus on domestic herds (e.g. hobby flocks) on private lands bordering the Tetons and those grazing in adjacent mountain ranges.
- Collar Jackson herd bighorn rams to identify risk of movements into the Tetons.
- Address the issue of pack goats on the National Forest in the Tetons.
- Continue to surveil disease occurrence in Teton Range bighorn sheep and mountain goats.

Hunting

Background - Excessive, unregulated hunting of bighorn sheep for meat and horns was a major factor in the decline of wild sheep in many of their former ranges. M. Whitfield (1983) recorded many records of legal and illegal hunting of bighorn sheep in the Tetons beginning pre-

settlement. Poaching of wild sheep in the Tetons remained a concern into much more recent times (Murie 1956). Although early hunting may not have had a large overall impact on the pre-settlement Teton Range bighorn sheep population, a more significant effect of over hunting may have been elimination of bighorn sheep that used lower elevation winter ranges and longer seasonal migrations. Currently WGFD administers a Teton Range hunt outside of GRTE with an allowance of 1 license for any age ram each year.

Expert Discussion - The experts asked if it is sustainable to remove 1 ram every 1-2 years, and how selective hunters have been in hunting for larger rams. WGFD responded that the hunters have been selective but have not always harvested rams of greater than $\frac{3}{4}$ curl. It was noted that given the demographics, the southern Teton's population is of greater concern. In the past 15 years, 15 rams have been taken, all from the southern subsegment. Recent flights have not detected many rams in the southern Tetons. With recognition that managers always have to assess the value of bighorn hunting in this area, it might be of value to direct the hunt to the northern Tetons population.

Recommendations:

- Consider eliminating of the Teton Range bighorn sheep hunting season with particular concern for the southern subpopulation. Identify trigger points for when a hunt should occur.
- When hunting occurs, balance harvest between the north and south segments.

Demographics--Small population size

Background - Over the past forty years until recently, the total Teton Range bighorn sheep population size was estimated to be around 125 with a static or declining population trend (Whitfield 1983). The minimum number of individuals identified through recent genetic sampling was 97; 40 unique individuals in the south and 57 in the north (GRTE unpublished data).

Expert Discussion - The general concern is that the Teton bighorn sheep population could persist for some time at these low numbers, but given its isolation from other populations, if a number of stressors happened all at once the population could die out quickly without any chance of rescue. As such, it is important to obtain and maintain accurate population estimates. The experts discussed the efficacy of photographic mark recapture (resight) techniques, particularly with remote cameras at mineral licks. GRTE has been exploring this approach and believes that it could be successful with a greater proportion of marked animals.

Recommendations:

- Obtain a more rigorous estimate of population size and demographic parameters. Mark-resight and/or genetic capture-recapture techniques may prove to be helpful. Consider new genetics methodologies (see below).
- Consider taking photographs during aerial surveys to aid in follow-up herd classification.
- Consider focused lamb surveys in the spring (winter survival) and fall. Improved monitoring of lamb survival and recruitment is important.
- Consider using remote cameras at mineral licks or along movement corridors to monitor lamb ratios/numbers;

- Consider developing a citizen science project to assist with bighorn sheep monitoring;

Genetics

Background - Research on the herd's genetic status indicates low genetic diversity, geographic isolation from neighboring herds, and genetic differentiation between the northern and southern segments of the Teton Range bighorn sheep population. An early study using gel electrophoresis methodology noted that the Teton Range bighorn sheep population was characterized by a relatively high inbreeding coefficient ($F = 0.014$) and low heterozygosity (Fitzimmons et al 1995). A follow-up 1997 pilot study provided genetic evidence (i.e. very low variability in mitochondrial DNA haplotypes) which supported biologists' suspicions that the Teton Range bighorn sheep population is isolated from other populations (Ramey 2006). A more recent study found that, genetic variation was lower in the northern and southern Teton sub-populations than in the Jackson herd. Tests for population bottlenecks suggest the Northern Teton sub-population had recently suffered a reduction in size and/or increased isolation (i.e. reduced gene flow). Results indicate substantial genetic differentiation between bighorn sheep in the Jackson herd and the Teton Range ($F_{ST} = 0.18$) and between the northern and southern sub-populations within the Teton Range ($F_{ST} = 0.12$) (Kardos et al 2010). This study recommended management actions to increase gene flow within the Teton Range population or from outside populations that use high elevation habitats like the Tetons sheep, but with careful consideration of disease risks. The study further recommended that the northern and southern bighorn sheep sub-populations be managed as distinct population units for conservation purposes owing to their genetic isolation from one another.

Expert Discussion - The current lack of connectivity with other bighorn populations' means that it is unlikely that the Teton Range bighorn sheep would be rescued naturally if locally extirpated. Experts asked if there is a source of clean sheep that behave similarly to the Teton Range bighorn sheep in wintering at high elevation. It was noted that the disease risk is too high to move bighorn sheep from the Absaroka area into the Teton area even though those sheep are also wintering at high elevation.

Recommendations:

- Fully assess the current genetic status of the Teton Range bighorn Sheep population.
 - Update herd level information on genetic connectivity and gene flow
 - Reassess measures of genetic drift
 - Obtain information on paternity (numbers of breeders and age structure)
- Consider using fecal DNA monitoring techniques to gain information on gene flow, population size, survival and recruitment, sex ratios etc. GRTE is now investing considerable resources to investigate this low impact means of population monitoring.
- Identify trigger points for when intensive conservation actions (e.g. genetic augmentation through moving pregnant females or young males among sub-populations within the Range or augmentation from outside the Range) are warranted.
- Augmentation of the Teton Range bighorn sheep population with bighorn sheep from other areas is not recommended at this time. Translocating bighorn sheep between the north and south sub-segments is also not recommended at this time.

Mountain Goats

Background - Mountain goats were introduced to the Snake River Range south of the Tetons in the late 1960s and early 1970s (Hayden 1989). This population expanded very rapidly in the 1980s and early 1990s and began to expand its range as habitats in the original areas declined in quality. It is thought that most of the movement into the Tetons occurred in this period. Observations of mountain goats in the Tetons were first documented in the late 1970s, but such reports were sporadic and thought to be transient individuals. A breeding population became established in the Tetons around the mid- to late- 2000s (GRTE unpublished data). Survival of radio-collared adults has been nearly 100%. There is currently insufficient data to quantify the Teton Range mountain goat population growth rate although all available information suggests the population is growing rapidly. The goat population is currently estimated at about 100 individuals. A recent modeling effort (DeVoe et al. 2015) predicted the amount of suitable habitat in the Tetons could support 4 times the number of goats currently present. A primary concern is that these non-native goats could transmit pathogens to Teton sheep and compete with and/or displace bighorn sheep on very limited winter ranges or optimal summer habitat. Snake River Range mountain goats, the likely source of Teton mountain goats, tested positive for a suite of pathogens that could lead to pneumonia if transmitted to the Teton Range bighorn sheep population. Genetic and pathogen data suggests that there is not currently much movement of Snake River Range goats into the Tetons (GRTE unpublished data). The chance of an expanding mountain goat population having an impact on bighorn sheep, whether from disease, competition, or displacement, is high. Grand Teton National Park released a management plan for public comment in December 2018. The preferred alternative calls for removing goats from the park using non-lethal (translocation) and lethal means.

To increase hunting harvest of mountain goats in the portion of the Tetons outside the park, the WGFD, established a new hunt area (HA 4). Beginning in 2019, the Department offered a limited quota Type A license (any mountain goat) that is not restricted by the once-in-a-lifetime draw.

Expert Discussion - Bob Garrott's student published a resource selection study of GPS-collared bighorn sheep and mountain goats in the northeast Greater Yellowstone area that demonstrated that there was almost no niche separation between resident bighorn sheep and mountain goats (Lowrey et al. 2018). When direct competition for limited resources occurs, mountain goats usually displace bighorn sheep (Chadwick 1983, Reed 2001). Thus, on shared high elevation winter range displacement of bighorn sheep by mountain goats is expected. Goats can do better than sheep with challenging nutritional situations as they are more inclined to use browse. Experts also asked if the goat movement from the original reintroduction site into the Tetons is still occurring. This is not known. There is evidence that the very rapid expansion of the mountain goats at the original introduction sites in Palisades Creek led to habitat degradation and enhanced movement of goats into other areas in the 1980s (Hayden 1989). Mountain goat numbers in the Palisades/Big Elk areas of the Snake River Range have declined in more recent years. Evidence from recent history of mountain goats and bighorn sheep that cohabit ranges in Nevada strongly suggests passage of pathogens from mountain goats to bighorn sheep (Wolff et al. 2019). The experts also discussed the potential use of contraception for the Teton goats, but there are limited effective options and delivery in the wild would be very difficult.

Recommendations:

- Support removal of mountain goats from the Tetons.
- Develop a mechanism to quickly remove newly arrived goats from the Tetons.
- Improve understanding of how goats are using Teton Range habitats given their rapid expansion at a time when the native bighorn sheep are not faring as well.

Predation

Background - Several potential predators occur in the range including: mountain lions, wolves, grizzly and black bears, coyotes, wolverine, and golden eagles. No studies have been conducted to look specifically at predation of Teton Range bighorn sheep, although when possible studies of radio collared individuals followed-up on mortalities to determine cause of death. With limited data, it does not appear that predation is a major source of mortality.

Expert Discussion - Mountain lions have created severe predation issues in some vulnerable bighorn sheep populations.

Recommendations:

- Predation does not currently appear to be a significant issue in the Tetons. Continue to monitor mortality causes.

Human Recreation

Background - Teton Range bighorn sheep are, with a few exceptions, extremely sensitive to human activity in winter habitats. In the 1970s-1990s the primary concern for recreational conflict with Teton bighorn sheep was snowmobile use as advances in snow machine technology allowed people to access Teton Range bighorn sheep winter ranges. Extensive public outreach led by Mary Maj of the Targhee National Forest and increased acceptance of Wilderness regulations mitigated most of this concern. In recent years, backcountry skiing has become more of a concern as newer ski technology and increased recreation numbers have led to more use of high elevations in winter. Backcountry skiing is very popular in the southern Tetons on the BTNF and in the Park. Many skiers exit Jackson Hole Mountain Resort to ski outside the resort boundary in the backcountry. Courtemanch (2014) completed extensive research into human and bighorn sheep interactions on winter ranges in the Tetons. Courtemanch found bighorn sheep avoid high quality winter habitat that is heavily used by winter recreationists. In her habitat modeling, Courtemanch (2014) noted up to a 30 percent reduction in high quality winter habitat for some individuals in areas of high recreation activity due to their avoidance of areas of backcountry recreation. Further, Courtemanch found sheep wintering in areas with high recreation activity have higher daily movement rates, larger home ranges, and, therefore, expend more energy, than sheep wintering in areas with little to no recreation.

There are two long standing winter closures in Grand Teton National Park to all human entry in bighorn sheep winter range in the south-central portion of the Range. There are no closures in the northern Tetons although this area is gaining in popularity for backcountry skiers. The skier community generally respects these closures, but large amounts of winter range remain unprotected.

Expert Discussion - Other work has shown that ungulates can habituate to predictable types of disturbances (e.g. vehicles on roads or trails), but struggle to habituate to backcountry skier behavior as it is less predictable in space and time. The experts spoke of examples from Nevada and California where sheep are habituated to humans. There may be opportunities in the Tetons for the skiers to access high quality ski terrain in ways that are predictable to wintering bighorn sheep while also avoiding important bighorn sheep winter ranges.

Recommendations:

- Engage the public in shared ownership of planning to ensure responsible recreational activity in sensitive wildlife habitats. Consider focusing skier activity for more predictable backcountry use. Build support for any changes.
- Examine the impacts of summer recreation on the Teton Range bighorn sheep population and their lambing ranges.
- Update and improve recreation use monitoring in all seasons to provide a baseline.

Climate change

Background -- The duration and depth of snow cover, which are strongly correlated with mean temperature and precipitation, are key factors controlling alpine ecosystems (Beniston 2003). Snow cover provides frost protection for alpine plants in the winter, as well as the water supply in spring. Reduced snowpack with warming is likely to cause major changes in alpine plant communities (Gottfried et al. 2012). The duration of time that high quality forage is available may decline in mountainous habitats where warmer springs encourage faster green-up (Pettorelli et al. 2007; Wagner and Peek 2006).

Expert Discussion -- Climate change can result in a high likelihood of rain on-snow events in mid-winter with consequent “locking up” of winter forage. Climate change appears to be reducing the nutritional quality of summer ranges of Dall sheep (*Ovis dalli*) in Alaska.

Recommendations:

- There is a need to more fully consider the cumulative effects of climate change on winter mortality and quality of summer habitats.

PART 2: Community Outreach Efforts

In the fall of 2017, with the assistance of a communications specialist, the working group developed a strategy to help frame the narrative around bighorn sheep conservation, specifically related to winter habitat needs of the bighorn sheep. The document also identified key audiences and messages and tools for getting the message out. One of the tools identified was to meet with people one-on-one or in small groups to share the information and data about the bighorn sheep, but also to understand their perspectives. Between December 2017 and November 2019, the working group engaged in more than 45 one-on-one or small group conversations with about 80 individuals from the winter backcountry community. The purpose of these conversations was to gauge community awareness of the plight of Teton Range bighorn sheep and learn the perspective and concerns of community members on the issue of bighorn sheep winter habitat needs and winter backcountry access in the Tetons.

The goal of the community conversations was simply to share information and learn the perspectives of community members. There was no attempt to reach consensus or agreement, rather the purpose was to elicit a range of opinions, concerns, and the participants' ideas for possible solutions and ways to engage the broader backcountry community. The themes summarized below represent the views of the individuals contacted, not necessarily those of the backcountry community as a whole. However, they do help managers better understand the range of concerns and values that may be important to individuals and the broader community. Those we talked to were generous with their time and candid and open with their feedback. The feedback was helpful in identifying parts of the issue that are not well understood, where the working group can focus efforts to promote greater awareness and a deeper understanding of the complexity of the issue.

Key Findings: Community Outreach Efforts

Below is a summary of the general themes and thoughts that emerged from the community conversations.

Theme 1: People are not aware of the issue

- There is high-turnover in winter backcountry users in the community. Bighorn sheep managers need to do more education and outreach.
- Many individuals expressed that they did not know Teton Range bighorn sheep were in trouble.
- Biologists need to better demonstrate the direct connection between bighorn sheep decline and backcountry skier increase
- Biologists need to better articulate and share how recreation affects the bighorn sheep population. In general backcountry recreationists view their sport as very low impact. More education is needed to describe how these activities can disturb wildlife.
- Many observed that bighorn sheep that winter at the National Elk Refuge near Miller Butte seem okay with people in close proximity and lick their cars and asked why those sheep are not negatively impacted.
- People see bighorn sheep hanging out near the top of the Tram at the Jackson Hole Mountain Resort with no apparent issues. Why aren't these sheep disturbed?
- We need to remind our community what is at stake – extinction of a native population.
- Are there impacts to sheep everywhere in the Tetons or just certain places? Where are those places?
- Some people want more research/studies before decisions are made.

Theme 2: Concern about access and freedom

- There is an extremely rich history and strong culture (both locally and globally) of backcountry skiing in the Tetons.
- Winter backcountry users expressed concerns about:
 - losing access to specific area/places;
 - complete closure of larger geographic areas;
 - complete closure of massive landscapes (i.e. all of the Tetons); and
 - additional closures could result in the loss of “aspirational terrain” (extreme skiing routes where few people go, but others dream of going there one day). Some of these areas are important for ski guiding businesses because they have

return clients that work on improving and honing their skills every year in order to ski them some day.

- There was some support expressed for the following:
 - closures in certain areas, but recreationists want to be a part of the conversation; and
 - closures with designated routes through them
- A few individuals expressed sentiment along the lines of *the sheep have had their day, it's our day now*.
- Some winter backcountry users like the idea of responsible recreation – i.e. where wildlife disturbance is minimized/eliminated.
- Some winter backcountry users expressed frustration that a few vocal individuals are driving this conversation and making the ski community as a whole “look bad”. At the same time, they are apathetic that their opinion will mean anything because they aren't part of the “cool crowd”.

Theme 3: Skiers feel singled out

- There is some skepticism among winter backcountry users that have a negative impact on bighorn sheep.
- Some winter backcountry users thought there were bigger issues affecting the sheep like mountain goats, ski resort development, or predators. Some skiers feel that their impact is relatively low compared to other things.
- Some winter backcountry users expressed the need better explain why bighorn sheep on the National Elk Refuge are not afraid of cars yet skiers have a disturbance effect in the Tetons.
- Most people recognize that the numbers and reach of backcountry use has increased substantially during the past several decades, but a minority of people claim backcountry use is not increasing.
- Need to illustrate it is not just skiers that have been or are being asked to sacrifice for these sheep – domestic sheep grazing is gone, there are restrictions on resort development/backcountry access, reduced hunting tags and hunting opportunities, snowmobile use is restricted due to Wilderness, many winter closures for other ungulates in lower elevations – why not sheep in these higher elevations?
- Some backcountry winter users were interested to know:
 - If winter is so hard on the sheep, why don't wildlife managers feed them?
 - Even if we make a lot of changes, isn't the herd so small that it will go extinct anyway?
 - Why don't agencies transplant sheep from elsewhere into the Tetons to help the herd?

Theme 4: Wildlife managers are moving too slow

- A lack of information and decisions causes people to stew and stir, uncertainty adds to the rumor mill.
- Some backcountry winter users are unaware of how policy evolves across multiple federal agencies. It does move slowly and folks are burning out on the bighorn sheep issue because of the lack of policy implementation. What will agency managers support, what are they thinking?

- Some individuals were curious why agency decision makers were not present at the numerous public meetings, what their position was on the issue, and whether they would support the biologist and expert panel recommendations.
- Give us a timeline, how long will this really take?
- Some people feel that the agencies have already made their decisions, so it's pointless to participate in public meetings.
- Confusion over the multiple agencies involved and their roles.
- It is confusing for the public that there are so many different people speaking to this issue- there is no one leader.
- Many individuals and organizations have been confused by the different type of process we are embarking on for this issue instead of typical NEPA process. This has created confusion and frustration.

Themes 5: Skier Ideas

- Voluntary self-regulation seems to work, maybe use this model (e.g. no one snowmobiles at the top of Teton Pass)
- Incentives or trade-offs (e.g. allow uphill traffic at JHMR, plot routes through habitat areas)
- Plow road to Jenny Lake to facilitate access to central portion of the range.
- Develop route specific "rule sets"
- Find ways to make skiers more predictable
- Identify routes through important bighorn sheep winter ranges
- No closures
- Create a list of "responsible recreation" guidelines – recreate without disturbing the wildlife
- Increase education and awareness in the ski community about disturbance to wildlife and to "turn around" if you see wildlife that you might disturb
- Desire for more tools that people can use to do the right thing, such as an app on your phone showing the existing closures and your location
- Collar at least one sheep in every group and share location data in real-time so that skiers can know where they are and avoid them
- Develop a bighorn sheep reporting system (similar to how avalanches can be reported). This would allow people to check where sheep have been observed recently and avoid those areas.

Themes 6: Concern for the herd

- Elected officials are interested in this issue and have asked how they can help.
- There is local and national interest from bighorn sheep conservation groups.
- Need to remind people what is at stake for this herd – local population extinction.
- The majority of skiers we talked to are conservationists at heart and don't want their actions to hurt bighorn sheep.
- People recognize that bighorn sheep are an iconic species of the Tetons and don't want to lose them.
- Some people in the ski community have voiced that "we have many places we can ski, but the sheep only have these few areas to survive", so we can go other places.

SUMMARY

Backcountry winter recreation, especially skiing is very important to the identity of Jackson Hole and there is a long and rich history of backcountry skiing in the Teton Range. Through our conversations with community members we learned that there is a lot of interest in this topic/issue and we heard loud and clear that people are very concerned about losing access. At the same time, many of the people we talked to are conservation oriented, expressed concern for the sheep, and were supportive of being part of an effort to identify possible solutions that balance conservation of Teton Range bighorn sheep and backcountry winter recreation.

RECOMMENDATIONS

Based on the technical feedback from the expert panel and our community conversations, the working group identified several actions to advance conservation of the Teton Range bighorn sheep population:

Expert Panel Recommendations

In the short term, move forward with high priority expert panel identified actions, strategies, or recommendations including mountain goat removal, addressing human disturbance on bighorn sheep winter ranges, and enhancing the quality of demographic data collection. In the longer-term, update the Teton Range bighorn sheep working group strategic plan to incorporate new data and information and the expert panel recommendations.

Collaborative Learning Process

In the short-term, members of the working group recommend that the group collectively move forward with a collaborative learning process on the topic of backcountry winter recreation and bighorn sheep.

1. Engage the public in a structured, collaborative learning process. This process would consist of a series of evening public workshops, facilitated by a neutral party and open to all interested participants with clear guidelines, objectives, and process. The Teton Range bighorn sheep working group would host the meetings. Key elements of the process include the following: open to all, shared learning, transparent, and collaborative development of community-supported possible solutions that meet agency policies.

The meetings would be structured as follows:

- a. **Meeting 1:** Laying the foundation -- Explore expert knowledge (from bighorn sheep and backcountry skiing experts) and ask the community to identify interests, issues, and values.
 - b. **Meeting 2:** Conceptual solutions -- Brainstorm possible solutions to this issue. What are broad ideas/solutions that could be considered?
 - c. **Meeting 3:** Geographical solutions -- Build off of conceptual solutions from last meeting and identify on-the-ground, site-specific solutions with the help of maps.
 - d. **Meeting 4:** Report back to the public -- Report back to the community explaining which suggestion can be carried forward and why.
2. Convene an interagency meeting. In addition to these public workshops, Dr. Western will meet with representatives from government agencies to review the draft list of suggestions that are developed through this process. Each suggestion from the community will receive a response as to why it can or cannot be considered for implementation by the agencies, based

on legality, jurisdiction, feasibility, cost, etc. These responses will be shared with the community during workshop #4.

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APPENDIX A
Expert Panel Recommendations

General: Action Items
Focus on preserving the bighorn population and occupied habitat that we now have and actively manage the threats.
Identify concerns/issues the working group can address positively in the near term.
Habitat/Nutrition: Action Items
Enhance population and health monitoring <ul style="list-style-type: none"> • Consider assessing body condition using remote cameras or other methods in conjunction with continued captures; • Consider placing remote cameras on winter range to monitor sheep and public interaction and effectiveness of outreach; • The condition of bighorn sheep going into winter is not well understood. Fall captures of a small number of bighorn sheep to assess body condition could provide the best measure of summer nutrition and an index of summer range condition; • Place greater emphasis on monitoring lamb survival and recruitment, particularly during bottleneck periods (e.g. winter starvation). Concentrated lamb surveys in the spring and fall could address this; • Assess the impact of research captures on bighorn sheep.
Cooperate and coordinate with federal fire personnel and land managers to identify and implement management action (e.g. prescribed fire, wildland fire use) to enhance bighorn sheep ranges and migration habitats, where possible and appropriate.
Consider a summertime nutritional study to understand how quality of summer range affects the sheep herd or alternately conduct captures earlier (i.e. October) to assess nutritional condition and track summer range quality. Quality of summer range is particularly important for sheep that winter in high elevations and depend upon stored body fat.
Limited Winter Range – Access to lower elevations: Action Items
Work with appropriate specialists (e.g. social scientist, fire ecologist, silviculturalist, recreation staff, etc.) to identify areas and develop a mechanism to allow for natural fire ignitions in bighorn sheep habitat. Consider the use of prescribed fire to improve winter range conditions, where appropriate.
Reduce disturbance to sheep on priority winter ranges.
Domestic Sheep Grazing: Action Items
Conduct a disease risk assessment for areas around the Tetons with specific focus on domestic herds (e.g. hobby flocks) on private lands bordering the Tetons and those grazing in adjacent mountain ranges.
Disease: Action Items
Prevent respiratory disease transmission to Teton Range bighorn sheep, with particular reference to keeping bighorn sheep from the Jackson herd and Snake River Range mountain goats from coming to the Tetons.
Remove mountain goats from the Teton Range.
Develop mechanisms to remove newly arrived mountain goats in the Tetons quickly.
Conduct a disease risk assessment for areas around the Tetons with specific focus on domestic herds (e.g. hobby flocks) on private lands bordering the Tetons and those grazing in adjacent mountain ranges.
Collar Jackson herd bighorn rams to identify risk of movements into the Tetons.
Address the issue of pack goats on the National Forest in the Tetons.
Continue to surveil disease occurrence in Teton Range bighorn sheep and mountain goats.
Hunting: Action Items
Consider eliminating of the Teton Range bighorn sheep hunting season with particular concern for the southern subpopulation. Identify trigger points for when a hunt should occur.

When hunting occurs, balance harvest between the north and south subsegments.
Demographics – Small Population Size: Action Items
Obtain a more rigorous estimate of population size and demographic parameters. Mark-resight or genetic capture-recapture techniques may prove to be helpful. Consider new genetics methodologies (see below).
Consider taking photographs during aerial surveys to aid in follow-up herd classification.
Consider focused lamb surveys in the spring (winter survival) and fall. Improved monitoring of lamb survival and recruitment is important.
Consider using remote cameras at mineral licks or along movement corridors to monitor lamb ratios/numbers;
Consider developing a citizen science project to monitor bighorn sheep;
Genetics: Action Items
Fully assess the current genetic status of the Teton Range bighorn Sheep population. <ul style="list-style-type: none"> • Update herd level information on genetic connectivity and gene flow • Reassess measures of genetic drift • Obtain information on paternity (numbers of breeders and age structure)
Consider using fecal DNA monitoring techniques to gain information on gene flow, population size, survival and recruitment, sex ratios etc. GRTE is now investing considerable resources to investigate this low impact means of population monitoring.
Identify trigger points for when intensive conservation actions (e.g. genetic augmentation through moving pregnant females or young males among sub-populations within the Range or augmentation from outside the Range) are warranted.
Augmentation of the Teton population with sheep from other areas is not recommended at this time. Translocating bighorn sheep between the north and south sub-segments is also not recommended at this time.
Mountain Goats: Action Items
Support removal of mountain goats from the Tetons.
Develop a mechanism to quickly remove newly arrived goats from the Tetons.
Improve understanding of how goats are using Teton Range habitats given their rapid expansion at a time when the native bighorn sheep are not faring as well.
Predation: Action Items
Predation does not currently appear to be a significant issue in the Tetons. Continue to monitor mortality causes.
Human Recreation: Action Items
Engage the public in shared ownership of planning to ensure responsible recreational activity in sensitive wildlife habitats. Consider focusing skier activity for more predictable backcountry use. Build support for any changes.
Examine the impacts of summer recreation on the Teton Range bighorn sheep population and their lambing ranges.
Update and improve recreation use monitoring in all seasons to provide a baseline.
Climate Change: Action Items
There is a need to more fully consider the cumulative effects of climate change on winter mortality and quality of summer habitats.

APPENDIX B Management Agency Policy/Sideboards, Roles, and Responsibilities

Growing recognition of the tenuous status of the Teton Range bighorn sheep population and the need for interagency cooperation in managing the population and its habitat led to the formation of the Teton Range bighorn sheep working group in 1990. Representatives from the park, WGFD, BTNF, CTNF, and several NGOs comprise the current working group. The purpose of the working group is to provide technical information to agency personnel responsible for managing the Teton Range bighorn sheep population and its habitat.

National Park Service – Grand Teton National Park

National Park Service Mission

The National Park Service preserves unimpaired the natural and cultural resources and values of the National Park Service System for the enjoyment, education, and inspiration of this and future generations. The Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.

National Park Service Management Direction and Policies

Management of national parks is guided by the NPS Organic Act (1916), the NPS Management Policies (2006), and other laws, executive orders, and regulations. As outlined in the Organic Act the NPS . . . shall promote and regulate the use of the . . . areas . . . by such means and measures as conform to the fundamental purpose . . . to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

The NPS Management Policies (2006) provide guidance for managing NPS units. These policies are based on laws, Executive orders, proclamations, regulations, etc. that govern NPS as well as departmental policies and longstanding NPS practices. Several key sections related to impairment and wildlife management are highlighted below.

Section 1.4.2 of the NPS management Policies concludes that both the term “unimpaired” in the 1916 Organic Act and the term “derogation” in the 1978 Redwoods Amendment are used to describe a “single standard” of “what the National Park Service must avoid” in managing park resources and values.

Section 1.4.3 explains how the Park Service should both conserve resources and values and provide for their enjoyment, but also declares that “when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to predominant.”

Section 1.4.4 identifies the impairment prohibition – separate from the above conservation mandate – as the “cornerstone of the Organic Act.”

Section 1.4.6 defines “what constitutes park resources and values” with a comprehensive list, including tangible resources of every kind from individual to landscape in scope; “the ecological, biological, and physical processes that created the park and continue to act upon it”; sensory experiences like visibility, natural soundscapes, and smells, with both tangible and

intangible aspects; “appropriate opportunities to experience enjoyment” of all the listed resources, but “without impairing them”; the park’s contribution to the values of the National Park System; and any additional specific attributes of the particular park.

Section 4.4.1 states that the NPS will *maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems.*

Section 4.4.1.1 directs the NPS to cooperate with states, tribal governments, federal agencies, and other land managers to conserve species populations and habitats.

Native species are defined in Section 4.4.1.3 as those that have occurred, now occur, or may occur as a result of natural processes on NPS system lands.

National Park Service Role

The NPS is responsible for managing wildlife and visitor activities within the park.

US Forest Service - Bridger-Teton and Caribou-Targhee National Forests

US Forest Service Mission

The mission of the Forest Service is to sustain the health, diversity, and productivity of the nation’s forests and grasslands to meet the needs of present and future generations.

US Forest Service Management Direction and Policies

Bighorn sheep are designated as a Sensitive Species by Region 4 of the USFS on the BTNF and CTNF. Sensitive species are those plant and animal species identified by the Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density and a significant current or predicted downward trend in habitat capability that would reduce species’ existing distribution (FS Manual 2670). Sensitive species of native plant and animal species receive special management emphasis to ensure their viability. Specific USFS policies and requirements apply to the management of sensitive species. These include objectives to 1) develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions, 2) maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System land, and 3) establish management objectives in cooperation with the States when projects on National Forest System lands may have a significant effect on sensitive species population numbers or distribution.

Aligning with the above Sensitive Species objectives, the Secretary of Agriculture’s Policy on Fish and Wildlife, Department Regulation 9500-4 (DR 9500-4), directs the Forest Service to, 1) manage habitats for all existing native and desired non-native plants, fish, and wildlife species in order to maintain at least viable populations of such species, and 2) habitat must be provided for the number and distribution of reproductive individuals to ensure the continued existence of a species generally throughout its current geographic range. Within these parameters, the US Forest Service is a partner in finding ways to integrate recreation demands with the federal requirement to provide suitable habitat for the Teton Range bighorn sheep population.

In addition, the Targhee portion of the CTNF has specific provisions in the 1997 Revised Forest Plan that guide habitat management for this herd. These include an objective to identify opportunities to improve bighorn sheep habitat through fire management for the Teton Range herd and a goal of coordinating with GRTE and the WGFD in the management of the bighorn sheep population and habitat (TNF Revised Forest Plan p. 111-156). This forest plan also directed the Forest to phase out domestic Sheep allotments on the Teton Range subsection of the Teton Basin Ranger District to separate domestic and bighorn sheep and reduce disease transmission risk to bighorn sheep, which has been completed.

US Forest Service Role

The primary role of the FS is as a habitat manager, although as noted above the Forests are also responsible for ensuring that viable populations of wildlife species are maintained. Habitat management for the bighorn sheep population is shared between the respective land management agencies, with each agency responsible for managing the lands within its jurisdiction. Both forests coordinate with and seek input from WGFD in habitat management efforts for bighorn sheep and other species.

Wyoming Game and Fish Department

Wyoming Game and Fish Department Mission

Conserving wildlife -- serving people.

Wyoming Game and Fish Department Management Direction and Policies

The WGFD considers bighorn sheep to be a Species of Greatest Conservation Need due to their constricted range and susceptibility to large population die-offs due to pneumonia from domestic sheep. There are three levels of conservation priority for bighorn sheep herds in the state, as described in the Statewide Bighorn/Domestic Sheep Interaction Working Group Plan (2004), which is now Wyoming Statute 11-19-604 (2015).

The Teton Range bighorn sheep population is considered a “Core Native Herd”, which is the highest priority level. There are only four such herds in the state and they receive this designation because they have never been extirpated (gone extinct) or been augmented through management transplants of sheep. For these reasons, the WGFD is committed to ensuring the future sustainability of the Teton Range bighorn sheep herd.

Wyoming Game and Fish Department Role

WGFD is charged with managing wildlife species in the state for the benefit of the citizens of Wyoming. Management follows the North American Model of Wildlife Conservation, the core tenets of which include: 1) wildlife is a public resource that is managed by the government on behalf of all citizens, and 2) long-term sustainability of wildlife populations will be ensured by using science-based decision-making and policy. The WGFD places a heavy emphasis on public participation and input in wildlife management decisions.

In simple terms, the WGFD is responsible for managing wildlife population numbers and health, whereas federal land management agencies such as the USFS are responsible for managing the land and habitat that these animals depend on. Likewise, the federal land management agencies are in charge of managing human activities such as camping,

motorized/non-motorized trail use, etc. An exception to this is that WGFD manages hunting and fishing through licenses and seasons. Due to these different responsibilities and the fact that many of these roles are intertwined, federal and state agencies work very closely together to collaborate on wildlife, habitat, and human activity decisions. The WGFD is responsible for managing the Teton Range bighorn sheep when they reside on BTNF or CTNF lands.

