National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science

Aerial Survey of Dall's Sheep Within Yukon-Charley Rivers National Preserve, July 2018

Natural Resource Report NPS/YUCH/NRR—2018/1701



ON THE COVER
Dall’s sheep rams in Yukon-Charley Rivers National Preserve, July 2018.
Photograph by: Kyle Joly

Aerial Survey of Dall's Sheep Within Yukon-Charley Rivers National Preserve, July 2018

Natural Resource Report NPS/YUCH/NRR—2018/1701

Kyle Joly, Matthew D. Cameron, and Mathew S. Sorum

Arctic Network Inventory and Monitoring Program
Gates of the Arctic National Park and Preserve
4175 Geist Road
Fairbanks, AK 99709

August 2018

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

The National Park Service, Natural Resource Stewardship and Science office in Fort Collins, Colorado, publishes a range of reports that address natural resource topics. These reports are of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

The Natural Resource Report Series is used to disseminate comprehensive information and analysis about natural resources and related topics concerning lands managed by the National Park Service. The series supports the advancement of science, informed decision-making, and the achievement of the National Park Service mission. The series also provides a forum for presenting more lengthy results that may not be accepted by publications with page limitations.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner.

This report received informal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data. Data in this report were collected and analyzed using methods based on established, peer-reviewed protocols and were analyzed and interpreted within the guidelines of the protocols.

Views, statements, findings, conclusions, recommendations, and data in this report do not necessarily reflect views and policies of the National Park Service, U.S. Department of the Interior. Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. Government.

This report is available from the Natural Resource Publications Management website. If you have difficulty accessing information in this publication, particularly if using assistive technology, please email irma@nps.gov.

Please cite this publication as:

Joly, K., M. D. Cameron, and M. S. Sorum. 2018. Aerial survey of Dall's sheep within Yukon-Charley Rivers National Preserve, July 2018. Natural Resource Report NPS/YUCH/NRR—2018/1701. National Park Service, Fort Collins, Colorado.

NPS 191/147728, August 2018

Contents

Page

Figures....iv

Tables....v

Executive Summary....vi

Acknowledgments....vii

Introduction....1

Methods....2

Results....3

Survey Logistics and Conditions....3

Core Area Survey Results....3

Ogilvie Mountain Unit Survey Results....5

Other Findings....5

Discussion....7

Literature Cited....8

Figures

Page

Figure 1. Yukon-Charley Rivers National Preserve (green) and core sheep survey unit boundaries 1

Figure 2. Dall's sheep population trends in the core 7-unit area of Yukon-Charley Rivers National Preserve, 1997-2018. 4

Figure 3. Dall's sheep age and sex ratios in the core 7-unit area of Yukon-Charley Rivers National Preserve, 1997-2018. 5

Figure 4. Summary of Dall's sheep harvest for Yukon-Charley Rivers National Preserve, 1983-2017. 6

Tables

Page

Table 1. Results of the July 2018 Yukon-Charley Rivers National Preserve sheep survey by unit. 3

Executive Summary

A minimum count survey of Dall's sheep (*Ovis dalli*) in Yukon-Charley Rivers National Preserve was conducted from July 14 to 16, 2018. The Preserve was last surveyed in July of 2015. The current survey examined the same 7 core mountain units as the previous survey and the Ogilvie Mountains were also surveyed. In the core area (the 7 units most often surveyed), 221 sheep (111 ewes, 39 lambs, 26 yearlings and 45 rams) were detected. This constitutes a 28% increase from the last (2015) survey, which had the lowest number of sheep ever reported (173). While the population has slightly rebounded since 2015, it is still approximately 30% below the 1997-2009 average of 313 sheep. There were 35 lambs, 23 yearlings, and 41 rams per 100 ewes in the core area. Lamb recruitment was the lowest ever recorded for the Preserve and was the 4th consecutive survey to detect a decline in this metric. If this trend continues, it could hamper population recovery in the Preserve. Yearling recruitment (26: 100 ewes) rebounded from its all-time low in 2015 (14: 100 ewes) but only equaled the long-term average from 1997-2009. The populations (Copper Mountain, Diamond Fork, Twin Mountain) that were small (total of 31 sheep combined in 2015) and had 4 or fewer ewes in them in 2015 all declined or at best remained the same size, dropping to 20 total sheep (an additional 35% from 2015). In contrast, the larger populations (5580 Mountain, Charley River, Cirque Lakes, Mount Sorenson) with 7 or more ewes in 2015 all increased, at least slightly. Overall this group of survey units increased by about 35% since 2015. Therefore, while the population is rebounding overall, it is more pronounced where a higher number of ewes are present. The survey units are relatively isolated and those units with few ewes and declining populations trends may take a longer time to recover because immigration will likely be limited in those areas until the other, more populous survey units make a more robust recovery. In the Ogilvie Mountains, 36 sheep were detected (14 ewes, 5 lambs, 2 yearling and 15 rams). This translates to 36 lambs, 14 yearlings and 107 rams per 100 ewes. These trends in age and sex ratio mirror those of the core area. Given the size of the unit and amount of potential sheep habitat, allotting more time to survey this unit in the future is recommended.

Acknowledgments

Rick Swisher (Quicksilver Air) safely piloted the R44 helicopter and served as the second observer. Jeff Wells, with the Alaska Department of Fish and Game, compiled harvest data from 1995-2017. We thank Jeff Wells for reviewing a previous draft on this report.

Introduction

Dall's sheep (*Ovis dalli*) inhabit the mountains and river bluffs of Yukon-Charley Rivers National Preserve (YUCH) at low density. Hunting, both sport and subsistence, of sheep is allowed in the Preserve. Since 1993, the sport hunt has been "open" (*i.e.*, it is not limited to a certain amount of drawing permit holders). Sheep surveys in the YUCH area started as early as 1973. Since 1997, aerial sheep surveys in YUCH have focused on 7 units (Figure 1; 5580 Mountain, Charley River Bluffs, Cirque Lakes, Copper Mountain, Diamond Fork Mountain, Mount Sorenson and Twin Mountain). Major declines in sheep populations from across Alaska in 2013 and 2014 were mirrored in YUCH, which had a 48% decline in sheep abundance between 2009 and 2015 (Joly 2015). In isolated survey units, declines ranged upwards to 96%. Winters have been more moderate since then and it was thought the population might be rebounding.

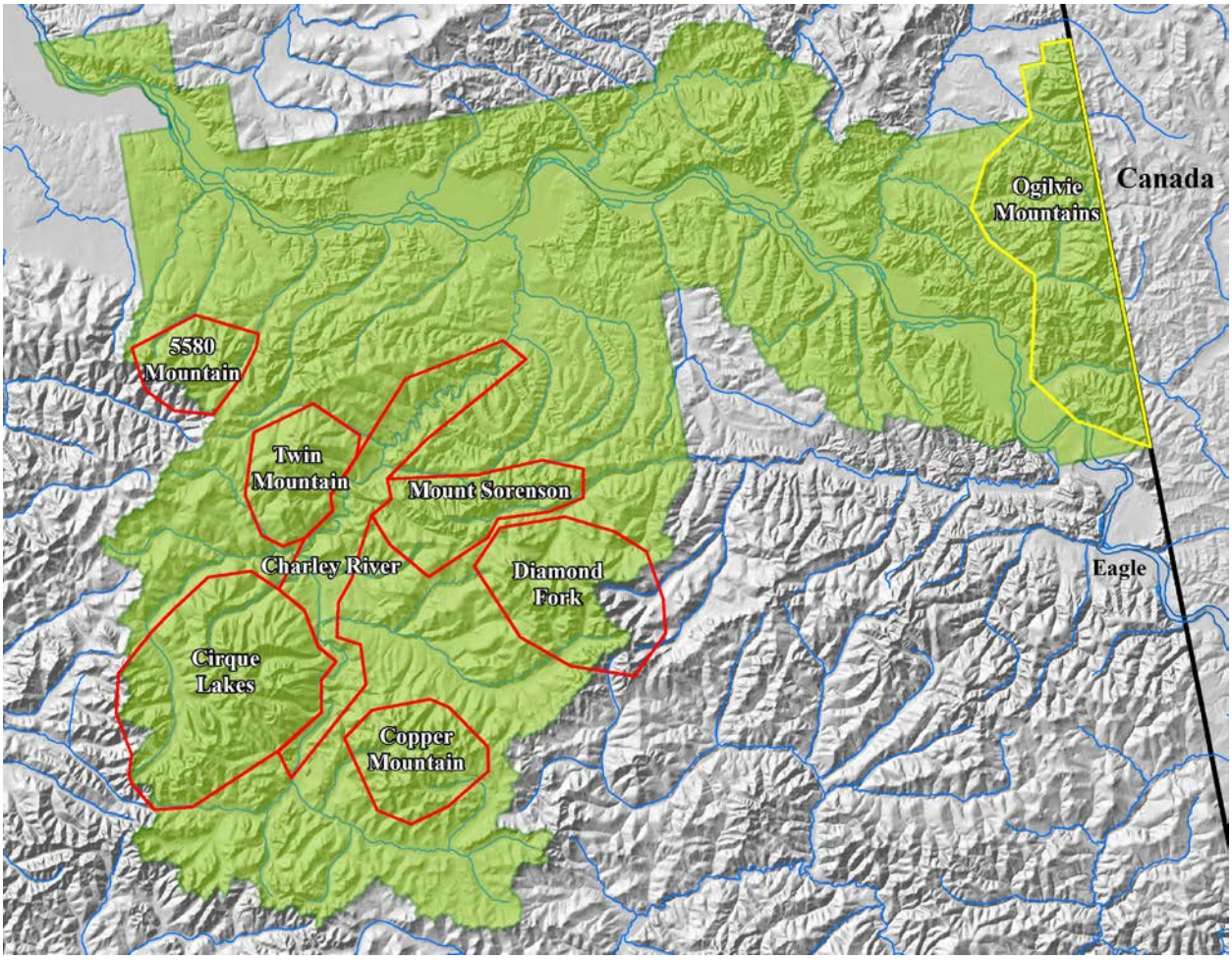


Figure 1. Yukon-Charley Rivers National Preserve (green) and core sheep survey unit boundaries (red polygons). The yellow polygon represents the Ogilvie Mountains survey area.

Methods

A minimum count survey was performed using a Robinson R-44 II helicopter piloted by Rick Swisher (Quicksilver Air), who also acted as an observer. The other observer was Kyle Joly. The survey employed the techniques used in the previous 4 surveys (Joly 2015). Each unit was surveyed from one end to the other, flying each mountainside and then the ridge top above, then the next mountain side (as opposed to flying contours around the mountain until the starting point was reached again and then flying the next contour around) until complete coverage was reached. Mixing this technique with contour flying provides faster coverage of individual drainages thereby reducing the chance of double counting or missing sheep that move over the top of a ridge. The flying was performed in such a way as to be able to see all the terrain that sheep might occupy above shrub line except for the Charley River unit (which is completely below the shrub line). Typically this was readily accomplished with a single pass through a particular area, but 2 or 3 passes were made in areas of steep, vertical, broken terrain, or in areas with patches of snow or dark shadows. When groups of sheep were spotted, the helicopter flew in close to sex and age each individual by horn size and shape, and body size. Sex-age classes included lambs, yearlings, ewes, sub-legal rams and legal rams (full curl or greater, tips of both horns broken ("broomed") and/or at least 8 years of age). The flight path was recorded via Global Positioning System (GPS) track files and a waypoint stored for the location of each group of sheep. Data were reported as a minimum count and with a sightability correction factor of 1.1 based on Lawler *et al*. (2005).

Results

Survey Logistics and Conditions

The survey was conducted from July 14 to 16, 2018. Survey flight time in the R44 helicopter was 11.26 hours for the core area (the 7 units most often surveyed). The units flown on July 14 were 5580 Mountain, Charley River, Mount Sorenson and Twin Mountain. Diamond Fork and Cirque Lakes were flown on July 15. Copper Mountain and Ogilvie Mountains were flown on July 16. Only 2.03 hours of survey flight time was used in the Ogilvie Mountains unit. Overall, weather conditions for the survey were good, with high overcast skies and calm winds for most of the survey. For very limited times and locations, rain and clouds hindered sightability but likely did not affect survey results in any units but Copper Mountain. Some snow was present at higher elevations and on the lee side of ridges. The temperature at survey altitudes ranged from 10° - 20° C (50° - 70° F).

Core Area Survey Results

A total of 221 sheep (111 ewes, 39 lambs, 26 yearlings and 45 rams) were detected (see Table 1 for survey unit summary). Using a sightability correction factor of 1.1 (see Lawler *et al*. 2005), 243 sheep were estimated to be in the core area of the Preserve. There were 35 lambs, 23 yearlings, and 41 rams per 100 ewes. There are now 8 years (i.e., 1997, 1998, 1999, 2001, 2002, 2009, 2015, and 2018) in which all 7 core units were surveyed, allowing for direct comparisons (Figures 2 and 3).

Table 1. Results of the July 2018 Yukon-Charley Rivers National Preserve sheep survey by unit. Survey time is in hours.

Survey Unit	Survey Time	Total Number of Sheep
5580 Mountain	0.63	15
Charley River	2.33	68
Cirque Lakes	3.92	68
Copper Mountain	1.35	10
Diamond Fork	1.47	2
Mount Sorenson	1.05	54
Twin Mountain	0.52	4

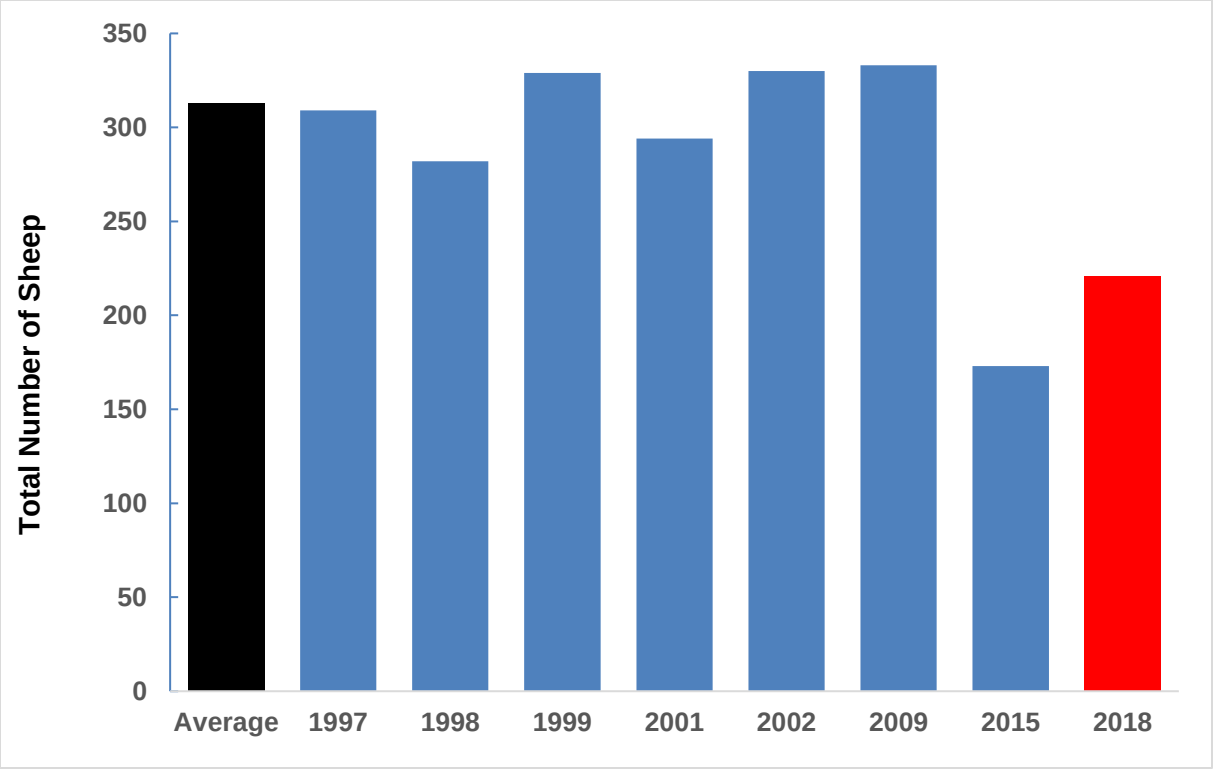


Figure 2. Dall's sheep population trends in the core 7-unit area of Yukon-Charley Rivers National Preserve, 1997-2018. Black bar is the average for years prior to the 2015 population decline (i.e., 1997-2009) and the red bar is the current (2018) survey.

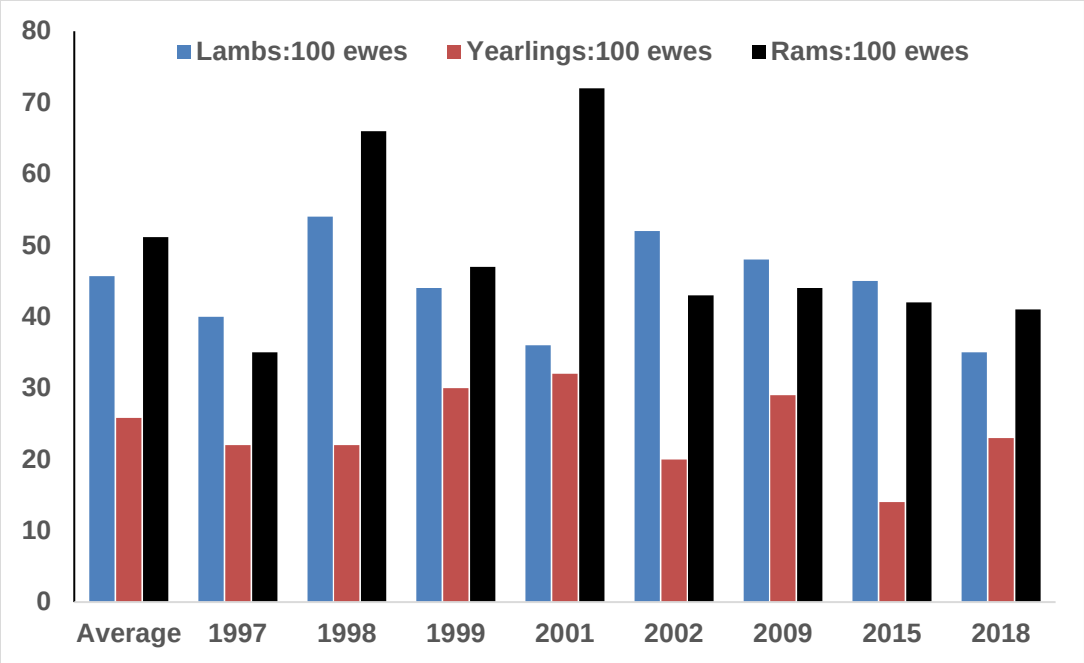


Figure 3. Dall's sheep age and sex ratios in the core 7-unit area of Yukon-Charley Rivers National Preserve, 1997-2018. The average is for years prior to the 2015 population decline (i.e., 1997-2009).

Ogilvie Mountain Unit Survey Results

A total 36 sheep were detected (14 ewes, 5 lambs, 2 yearling and 15 rams). This translates to 36 lambs, 14 yearlings and 107 rams per 100 ewes.

Other Findings

Harvest of Dall's sheep in the preserve is limited to rams that are full curl or greater, tips of both horns broken ("broomed") and/or at least 8 years of age. Harvest continues to be relatively low in the preserve (Figure 4).

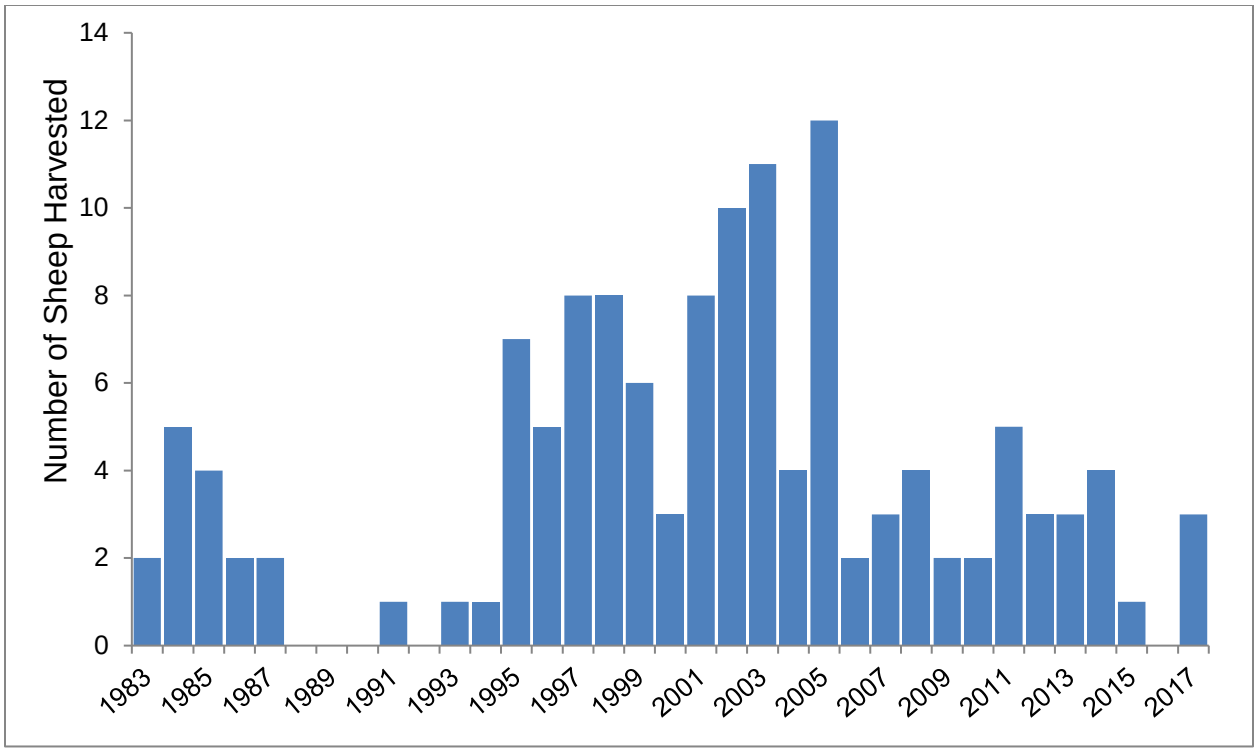


Figure 4. Summary of Dall's sheep harvest for Yukon-Charley Rivers National Preserve, 1983-2017. Data from Joly 2015 and the Alaska Department of Fish and Game.

Mycoplasma ovipneumoniae ("Movi") was found in wild Dall's sheep for the first time ever in Alaska in 2018 by the Alaska Department of Fish and Game. This bacterium can cause respiratory disease in susceptible hosts and is a serious conservation issue for bighorn sheep (*Ovis canadensis*) in the Rocky Mountains in the lower 48 states. Infected sheep were detected in a widespread area that includes Game Management Unit 25C, which is in core areas of sheep habitat inside YUCH. Thus far, no sheep have been reported showing signs of related illness. However, in another first of its kind finding, a dead caribou (*Rangifer tarandus*) was found inside YUCH that had Movi and showed signs of respiratory problems. Anyone encountering sheep or caribou that may be affected should report it to the Alaska Department of Fish and Game's Wildlife Disease Surveillance Reporting Line at (907) 328-8354 or send an email to dfg.dwc.vet@alaska.gov. Record the location, take photos of the carcass and abnormal tissue, and collect a lung for submittal to your nearest Alaska Department of Fish and Game office.

Discussion

After a 48% decline in the Dall's sheep population within the core area of Yukon-Charley Rivers National Preserve from 2009 to 2015, the 2018 survey revealed a 28% increase in the population. However, recovery was not uniform across the Preserve. Survey units (5580 Mountain, Charley River, Cirque Lakes, Mount Sorenson) with larger populations and more ewes rebounded by 35%, whereas units (Copper Mountain, Diamond Fork, Twin Mountain) with low abundance and ewe numbers actually continued to decline. These latter units may take quite some time to rebound given that they have few to no ewes in them currently. The other, relatively more populous units may need to recover sufficiently enough that they become population sources, via emigration, for the units struggling to recover. Lamb recruitment for this 2018 survey was the lowest on record and continues a 15-year declining trend within the Preserve. While the trend is not statistically significant, largely due to low sample size, this metric should be closely monitored in future years. Continued low lamb recruitment could further inhibit population recovery across the Preserve. Yearling recruitment did increase from 2015 to 2018 but only reached the long-term (1997-2009) average. An analysis of the potential impacts of severe weather on this population is in order.

The 41 rams: 100 ewes observed in 2018 was the second lowest ratio ever reported for the Preserve; however it is nearly the same as it has been in 2002, 2009 and 2015 (43, 44, and 42, respectively; Figure 3). The absolute number of rams increased from 2015 to 2018. Only about 3 sheep are harvested from within the Preserve each year (Figure 4) and this level of take is likely not substantively affecting the population.

We recommend continuing to fly all of the core units because it allows for direct comparisons from previous years and decreases the chances of spurious results stemming from movements among areas (Lawler *et al.* 2005). Preserve administrators should contemplate surveying the Preserve within the next few (2-4) years to see if the population is continuing to rebound from the decline, declines again or stabilizes. The R-44 helicopter remains the survey platform of choice for the Preserve and the current survey methodology continues to work well. More time should be devoted to the Ogilvie Mountains unit the next time it is surveyed because of the amount of terrain, its complexity and the number of visible sheep trails. Both the 2015 and 2018 surveys likely missed some sheep due to limited amount of survey time.

Literature Cited

Joly, K. 2015. Aerial survey of Dall's sheep: Yukon-Charley Rivers National Preserve, July 2015. Natural Resource Report NPS/YUCH/NRR—2015/1020. National Park Service, Fort Collins, Colorado. 13 pp.

Lawler, J., B. Griffith, D. Johnson, and J. Burch. 2005. The effects of military jet overflights on Dall sheep in Interior Alaska. Technical Report NPS/AR/NRTR-2005-51. National Park Service, Anchorage Alaska. 179 pp.

.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 191/147728, August 2018



Natural Resource Stewardship and Science
1201 Oakridge Drive, Suite 150
Fort Collins, CO 80525