



Dall's Sheep Survey within Yukon-Charley Rivers National Preserve

July 2023



Dall's sheep rams in the Ogilvie Mountains within Yukon-Charley Rivers National Preserve, July 2023.
NPS/MAT SORUM

Dall's sheep survey within Yukon-Charley Rivers National Preserve: July 2023

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Abstract

A minimum count survey of Dall's sheep (*Ovis dalli*) in Yukon-Charley Rivers National Preserve was conducted from July 18 to 20, 2023. The Preserve was last surveyed in July of 2018. The current survey examined the same 7 core survey units as the previous survey and the Ogilvie Mountains. In the core area (the 7 units most often surveyed), 70 sheep (32 ewes, 13 lambs, 6 yearlings and 19 rams) were detected. This constitutes a 75% decrease from the long-term average (284 sheep, 1997–2018) and a 68% decrease from the last survey (221 sheep, 2018). There were 40 lambs, 19 yearlings, and 59 rams per 100 ewes in the core area. Declines varied by space and sex classes. Declines were greater in survey units with historically fewer sheep and lower proportions of ewes (91% decline; 5580 Mountain, Copper Mountain, Diamond Fork, Twin Mountain) versus the survey units with more sheep and higher proportions of ewes (67% decline; Charley River, Cirque Lakes, Mount Sorenson). Across the latter more populous survey units, ewes and rams declined by 70% and 40%, respectively, compared to the long-term average. For the first time, no sheep were observed in two of the survey units (Copper Mountain and Diamond Fork). In the Ogilvie Mountains, 26 sheep were detected (18 ewes, 4 lambs, 0 yearling and 4 rams) representing a 28% decline since the last survey. This translates to 22 lambs, 0 yearlings and 22 rams per 100 ewes.

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 1995–2022. Funding for this survey was provided by the NPS Subsistence Advisory Council. I thank Matthew Cameron, Kyle Joly, and Jeff Gross 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 and makeup about a quarter of all the sheep that reside within the Yukon-Tanana Uplands. Both sport and subsistence hunting of sheep is allowed in the Preserve. Since 1993, the sport hunt has been managed under a general harvest hunt (i.e., it is not limited to a certain amount of drawing permit holders). Sheep have been surveyed within the Preserve by NPS staff since 1983, however since 1997, sheep surveys have included the same 7 survey units (Figure 1; 5580 Mountain, Charley River Bluffs, Cirque Lakes, Copper Mountain, Diamond Fork Mountain, Mount Sorenson and Twin Mountain). Although the YUCH sheep population has traditionally occurred at lower abundance relative to populations that inhabit larger mountain ranges across Alaska (e.g., Brooks Range, Alaska Range), it remained stable from the 1990s to late 2000's. However, over the last decade, the sheep population within YUCH experienced significant instability. Sheep declined by 48% between 2009–2015 before rebounding 27% between 2015–2018 (Joly et al. 2018). Since then, YUCH has experienced multiple difficult winters characterized by deep snow and late springs with many freeze-thaw events, including the winters of 2019–20, 2021–22, and 2022–23 (Sousanes et al. 2023). Given recent surveys indicating sheep declines in adjacent areas (Wells 2022), conducting a sheep survey within the Preserve was a priority.

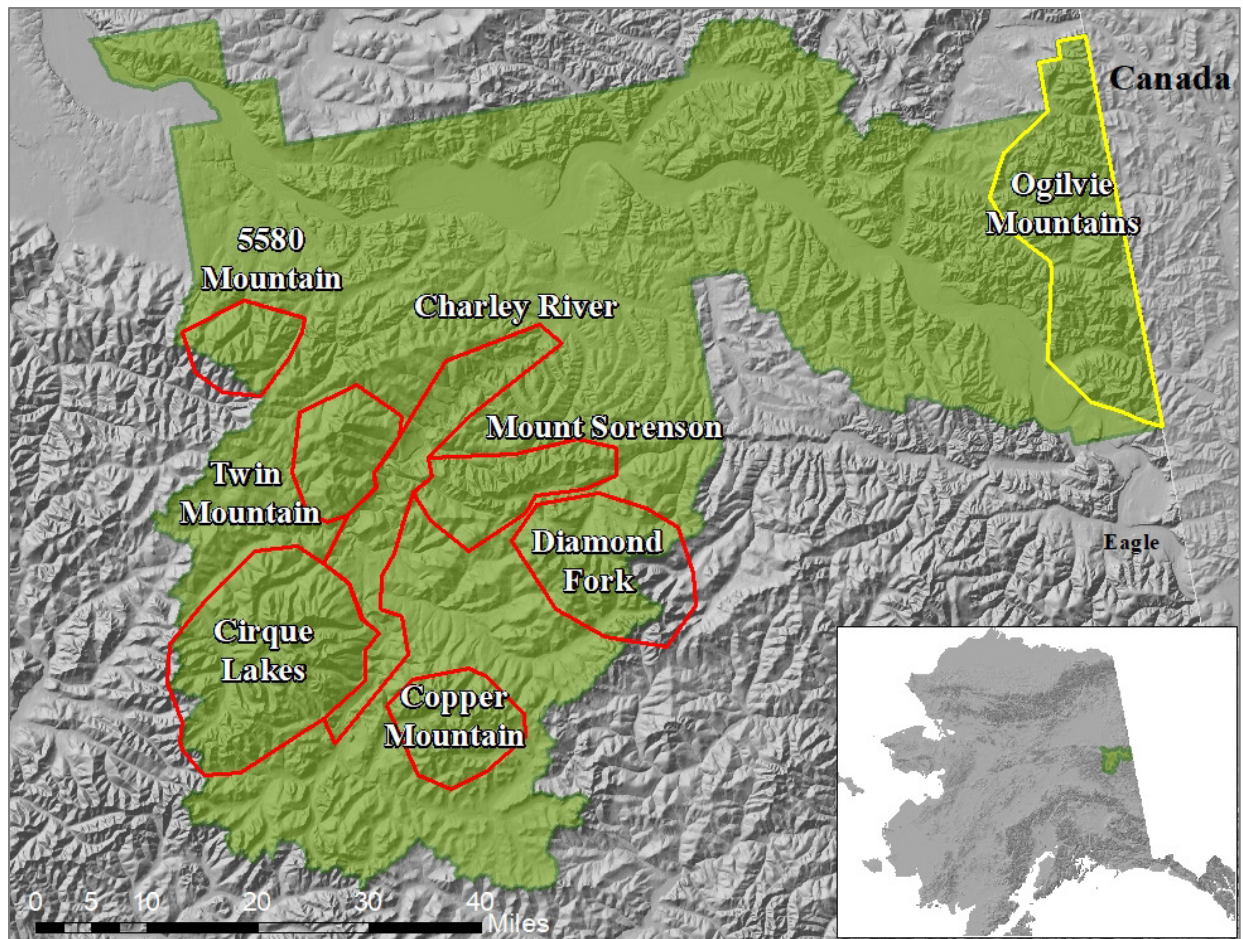


Figure 1. Yukon-Charley Rivers National Preserve (green) and the sheep survey unit boundaries. Red polygons represent core survey units and the yellow polygon represents the Ogilvie Mountains survey area.

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 additional observer. The survey employed the techniques used in the previous 5 surveys (Joly et al. 2018). 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. 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. The surveys were conducted entirely above shrub line except for the Charley River unit (which is completely below the shrub line). When groups of sheep were spotted, the helicopter flew within 200–500 feet above ground level to classify the sex and age of each individual by horn size, shape, and body size. Sex-age classes included lambs, yearlings, ewes (or ewe-like; this category includes rams of $\frac{1}{4}$ curl or less), $<\frac{1}{2}$ curl ram, $\frac{1}{2}$ to $\frac{3}{4}$ curl ram, $\frac{3}{4}$ to $<$ full-curl ram, and $\geq$ full-curl ram (full curl or greater, tips of both horns broken (“broomed”) and/or at least 8 years of age). All ram age composition data is aggregated to one ram category within this report. The flight path was recorded via Global Positioning System (GPS) track files and a waypoint recorded 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 18 to 20, 2023. Survey flight time in the R44 helicopter was 7.5 hours for the core area (the 7 units most often surveyed). The units flown on July 18 were 5580 Mountain and Charley River. Mount Sorenson, Diamond Fork, and Ogilvie Mountains were flown July 19. Twin Mountain, Cirque Lakes, and Copper Mountain were flown on July 20. Only 2.0 hours of survey flight time was used in the Ogilvie Mountains unit. Overall, weather conditions for the survey were good, with low overcast skies and calm winds on July 18–19 and clear, sunny skies and calm winds on July 20. Localized rain showers and low clouds reduced sightability but likely did not affect survey results in any units but Ogilvie Mountains. 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 70 sheep (32 ewes, 13 lambs, 6 yearlings and 19 rams) were detected. Using a sightability correction factor of 1.1 (see Lawler et al. 2005), 77 sheep were estimated to be in the core area of the Preserve. There were 40 lambs, 19 yearlings, and 59 rams per 100 ewes. There are now 9 surveys in which all 7 core units were surveyed (Figures 2 and 3).

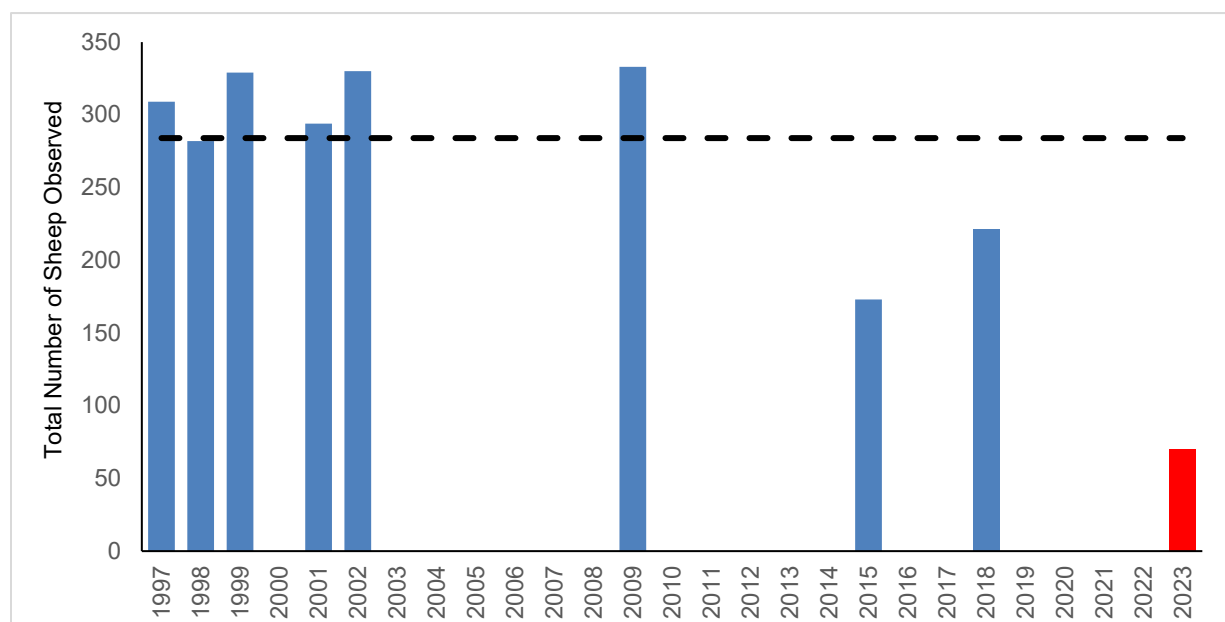


Figure 2. Dall's sheep population trends in the core 7-unit area of Yukon-Charley Rivers National Preserve, 1997–2023. Black dash line is the average (284 sheep) for years prior to the 2023 survey (1997–2018) and the red bar is the current (2023) survey.

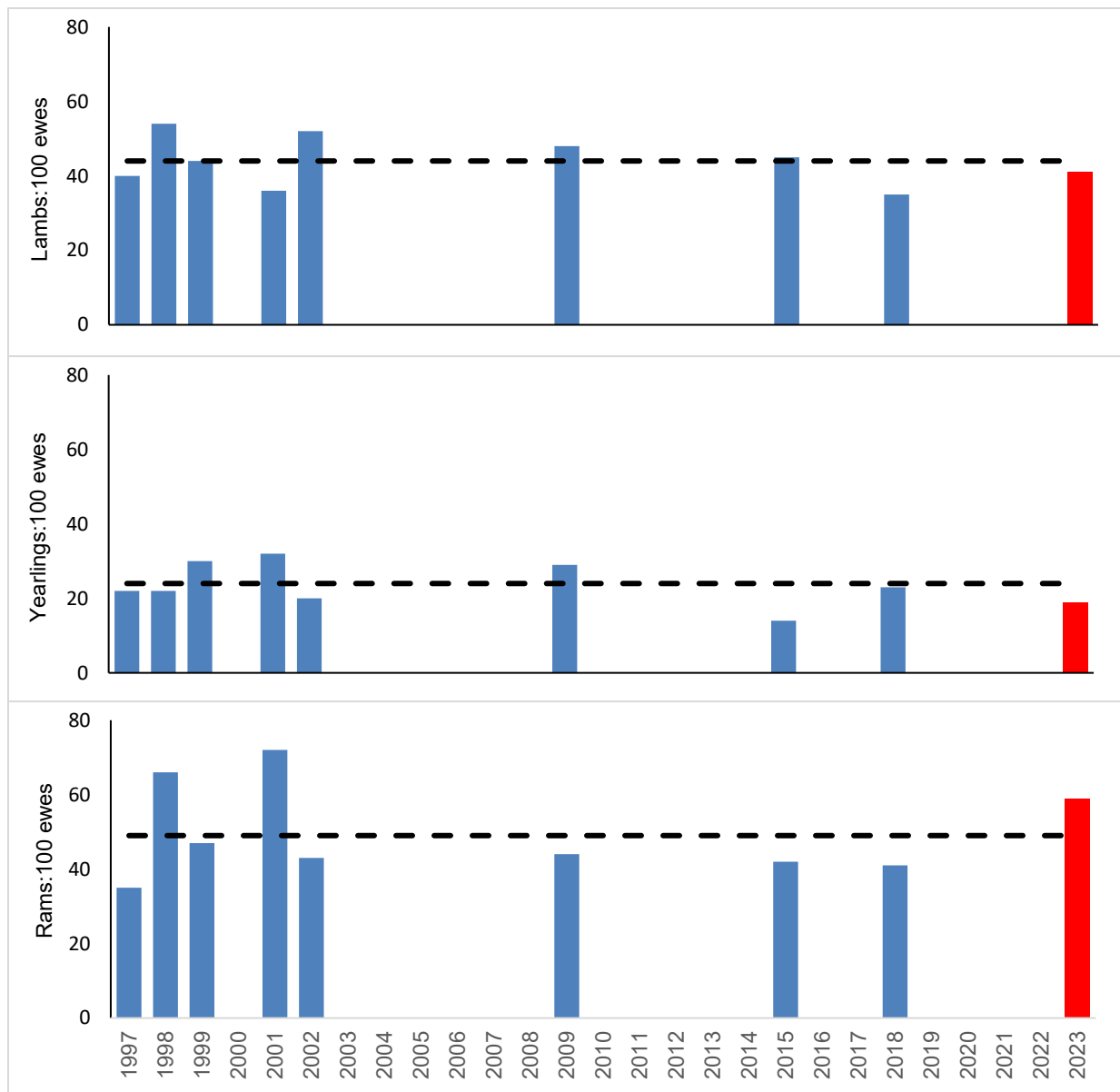


Figure 3. Dall's sheep age and sex ratios in the core 7-unit area of Yukon-Charley Rivers National Preserve, 1997–2023. Black dash lines are the averages (44 lambs:100 ewes, 24 yearlings:100 ewes, and 50 rams:100 ewes) for years prior to the 2023 (1997–2018) and the red bar is the current (2023) survey.

Ogilvie Mountain Unit Survey Results

A total 26 sheep were detected (18 ewes, 4 lambs, 0 yearlings and 4 rams) in the Ogilvie Mountain unit. This translates to 22 lambs, 0 yearlings and 22 rams per 100 ewes.

Harvest

Legal harvest of Dall's sheep in the Preserve is limited to rams that are full curl or greater, have tips of both horns broken ("broomed"), or at least 8 years of age. Harvest, since 2006, continues to be relatively low in the Preserve averaging 2.7 rams per year and is below the long-term average of 3.7 rams per year (Figure 4).

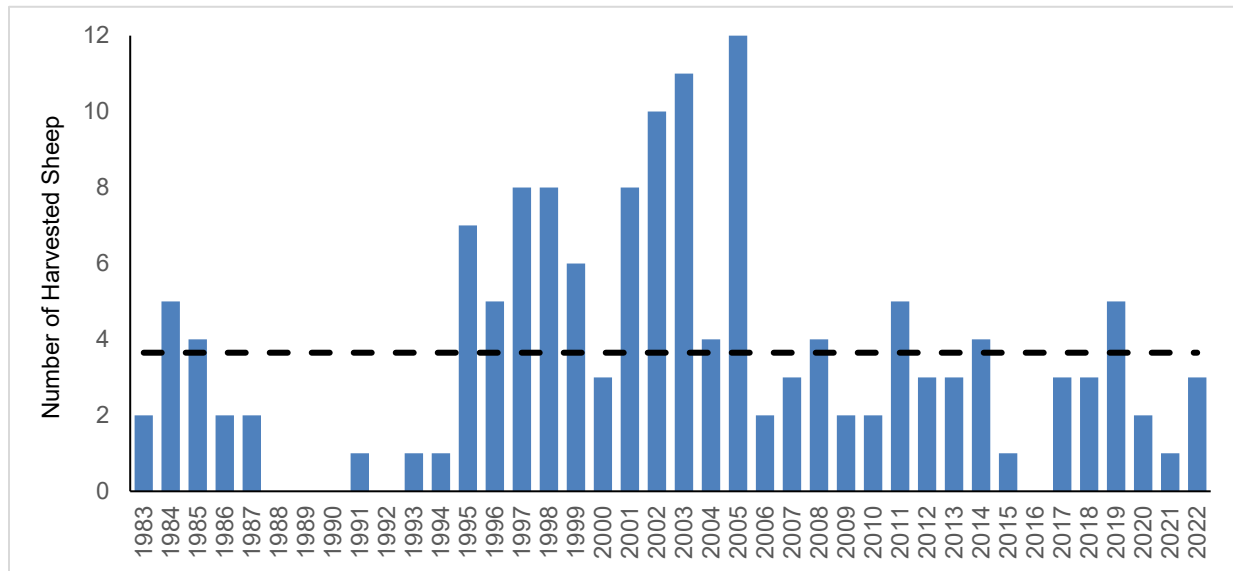


Figure 4. Summary of Dall's sheep harvest for Yukon-Charley Rivers National Preserve, 1983–2022. Black dash line is the average number of sheep harvested (3.6) for all years. Data from Joly et al. 2018 and the Alaska Department of Fish and Game.

Discussion

The total number of Dall's sheep observed within the core area of Yukon-Charley Rivers National Preserve was the lowest ever recorded and represented a 75% decline from the long-term average and a 68% decline from the previous survey. Additionally, for the first time, no sheep were observed in either the Copper Mountain or Diamond Fork survey units, which historically averaged 14 and 24 sheep, respectively. Climate factors may influence observed declines in sheep populations (Loehr et al. 2010, Alaska Department of Fish and Game 2011), with snow conditions, temperature and the timing of spring onset negatively affecting lamb reproduction and population abundance (Rattenbury et al. 2018, Cosgrove et al. 2021). Further, high rates of over-winter freeze-thaw events are known to decrease survival of adult sheep across Alaska (Van de Kerk et al. 2020). Since the last survey in 2018, YUCH has experienced multiple winters with deeper-than-normal snow, colder-than-normal springs, and multiple freeze-thaw events as measured from the weather station in Eagle, Alaska. The winters of 2019–20, 2021–22, and 2022–23 received 25 in, 16 in, and 21 in more snow-than-normal (average annual snowfall total (1990–2020): 62 in), respectively. The temperatures in April during 2020, 2022, and 2023 were 3.0°F, 7.1°F, and 7.8°F colder-than-normal (average April temperature (1990–2020): 29.8), respectively, and during the mid-winters of 2019–2020 and 2021–2022 there were 4 and 3 major thaws, respectively (Sousanes et al. 2023). Over this same period declines have been observed in adjacent sheep populations (Schmidt 2023, Wells 2023). Understanding the drivers of recent sheep declines within the Preserve was beyond the scope of this report, however, future research should focus on determining what factors influence sheep population dynamics across the Yukon-Tanana Uplands and developing mechanistic survival models that can be used in sheep management in the face of climate change.

The declines in sheep abundance varied spatially and between sex classes across the Preserve. The survey units with historically more sheep and higher proportion of ewes (Charley River, Cirque Lakes, Mount Sorenson) declined by 67% compared to the long-term average, whereas survey units with historically fewer sheep and lower proportion of ewes (5580 Mountain, Copper Mountain, Diamond Fork, Twin Mountain) declined by 91% from the long-term average. Across the more populous survey units, ewes and rams declined by 70% and 40%, respectively, while across the less populous survey units, ewes and rams declined by 92% and 89%, respectively, compared to the long-term average. Only a total of 3 ewes remained across the latter survey units. Recovery of the sheep population will likely vary spatially, since the more populous survey units contain a higher proportion of ewes and had begun recovering by 2018 following the early 2010's decline, while the units with fewer sheep continued to decline throughout the decade (Joly et al. 2018). As suggested by Joly et al. (2018), the relatively more populous units may need to recover sufficiently enough that they become population sources, via emigration, for the units struggling to recover.

Across the Yukon-Tanana Uplands many sub-populations of sheep are surveyed annually (Nelson 2019, Well 2023). This schedule allows immediate detections of major declines and provides current information to understand the health of the sheep populations. Over the last 22 years, sheep have only been surveyed in YUCH five times, with 3–7 years between surveys. This schedule prevented timely detection of the past 2 major declines, which, based on reports of adjacent sheep populations,

likely occurred after the difficult winters of 2012–2013 and 2019–2020 (Well 2023). I recommend surveying, at minimum, every 3 years and following winters with difficult conditions (i.e., deeper-than-normal snow and colder-than-normal spring temperatures) to provide up-to-date, detailed information for sheep management.

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