

CHARLEY RIVER DALL'S SHEEP GRAZING ENCLOSURES,
YUKON-CHARLEY RIVERS NATIONAL PRESERVE,
EAST-CENTRAL ALASKA

1994-1996 Data Summary

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Lisa M. Fox, U.S. National Park Service, Yukon-Charley Rivers National
Preserve, P.O. Box 167, Eagle, Alaska, 99738 USA.

Abstract: Little documentation exists for habitat use by Dall's sheep, or the role sheep
play in the disturbance and/or maintenance of sensitive vegetation associations within

Yukon-Charley Rivers NP. To expand the knowledge base for Dall's sheep habitat attributes, resource management personnel from Yukon-Charley Rivers NP installed 5 grazing exclosures at 4 locations within the upper Charley River basin to document sheep impacts on arctic steppe (alpine tundra) plant communities. The exclosures were installed in 1994 and ≥ 1 exclosure(s) were sampled in 1994, 1995, and 1996. Exclosure and control plots were sampled at each site using ocular estimation of percent cover for individual plant species. The purpose of this report was to compile existing data, methodology, and information about these grazing exclosures and make recommendations for future monitoring priorities and schedules. Monitoring of plots at grazing exclosures should continue, but annual visits are not required. Monitoring of the Dewey Bluff exclosure is of low priority due to minimal use by Dall's sheep.

INTRODUCTION

Dall's sheep are a valuable wildlife resource in east-central Alaska. Healthy Dall's sheep populations are an integral part of the pristine Charley River basin in Yukon-Charley Rivers NP, and the National Park Service (NPS) is mandated by law to protect these populations and their habitat. References to Dall's sheep and their habitat are numerous in the Preserve's management planning documents and in the laws enacted by congress to create this NPS unit. Enabling legislation for the Preserve states that the NPS is mandated to maintain "healthy and viable populations of native species" and to maintain "...the environmental integrity of the Charley River basin". ANILCA mandates the Preserve to " ...protect habitat for, and populations of, fish and wildlife, including but not limited to...caribou, moose, Dall's sheep, grizzly bears, and wolves." The general management plan (GMP) for the Preserve states that studies should be undertaken to "gather and analyze data about Dall's sheep in the upper Charley River basin...should include but not be limited to...movements, distribution, ...lambling areas...".

More recently, the Resource Management Plan for Yukon-Charley (1993) has stated that Dall's sheep habitat use and population dynamics require further investigation, and that an evaluation of sheep habitat in the Preserve should be conducted. Baseline information for the Preserve's Dall's sheep population is sparse. Currently, a 3-year study is underway to investigate the seasonal movements, distribution, and age structure of the population; and to identify areas used by sheep during lambing and rutting. However, there is still a lack of habitat use information; including data about the influence grazing sheep have on the ecology of the river bluffs they often inhabit. Habitat data scheduled to be collected during this study will be limited to recording vegetation types used by radiocollared Dall's sheep.

Arctic steppe communities are another unique and valuable component of the ecosystem encompassing the Charley River drainage. The patches of arctic steppe in this area are thought to be remnants of a vegetation community that was previously more widespread prior to the encroachment of the taiga forest. These communities primarily occur on steep, south-facing river bluffs in eastern interior Alaska, and the Charley River bluffs

provide potential habitat for arctic steppe plant species. Several of plant species included in these associations have been considered for federal listing as threatened or endangered. These include the Category 2 species: *Cryptantha shackletteana*, *Draba murrayi*, *Eriogonum flavum aquilinum*, and *Podistera yukonensis*, as well as other narrowly endemic species. To fully inventory and protect these plant communities, baseline data about colony locations, species composition, and response to disturbance are necessary.

Collectively, the bluffs along the Charley River are host to a unique assemblage of flora and fauna. There is an ongoing need for baseline information about these populations if the NPS is to fulfill its mission of protection and proper management for these natural resources. To further this goal, the NPS established 5 Dall's sheep grazing exclosures at 4 locations within the upper Charley River basin. These 5 sites were intended to provide plant species lists and relative percent occurrence for treatment (i.e., no grazing), and control (i.e., grazed) plots for arctic steppe plant communities that sustain use by Dall's sheep.

STUDY AREA

The study area is the Charley River basin within Yukon-Charley Rivers National Preserve, east-central Alaska. The Charley is a designated National Wild River and flows northward approximately 100 river miles from its headwaters in the Yukon-Tanana uplands to its confluence with the Yukon River. Approximately 260 river miles of tributaries in this watershed combine to cover more than 1,700 square miles of eastern interior Alaska. The Charley River watershed contains many unique features including a geologic record relatively unaltered by glaciation, the Tintina Fault, a wide variety of Alaskan vegetation associations, and diverse habitat for abundant and varied wildlife species such as peregrine falcons, Dall's sheep, and brown bears.

The Charley flows through 3 distinct topographic regions: upland valleys, entrenched canyons, and open floodplains. Elevations range from approximately 700 feet MSL at the Yukon River confluence to 6,000 feet MSL in the upper reaches of the headwaters. The Charley River lies within the climatic division of Alaska known as the interior basin. This area is characterized by cold winter temperatures and low-level temperature

inversions, and relatively dry, warm summers. Average annual temperatures range from -25 F to 60 F, and minimum/maximum temperatures of -75 F and 95 F have occurred. Average precipitation is extremely variable, ranges from 8-12 inches, and often occurs in the form of local, severe thunderstorms during the summer months.

Vegetation associations along the Charley River include a variety of subarctic forest and tundra types. These include spruce (Picea sp.) muskeg and lowland shrub communities on the lower Charley; open spruce woodland, mixed spruce/hardwood (Populus sp., Betula sp.)/forests, and nearly vertical rock bluffs which sustain alpine (tundra) plant communities. Arctic steppe plant communities containing candidate threatened and endangered plant taxa, as well as the endangered peregrine falcon, inhabit many steep bluffs on the Charley River.

METHODS

We installed grazing exclosures and control plots at 5 locations within the Charley River Basin during August 1994 (for locations, see attached topographic map). Two exclosures and associated control plots were installed near Cirque Lakes (exclosure numbers 1 and 5), and 1 set of exclosure and associated control plots were constructed at Sheep Bluff (exclosure number 2), Hanna Bluff (exclosure number 3), and Dewey Bluff (exclosure number 4) (see attached map). Fencing materials and personnel were transported to all sites via Bell Jet 206 helicopters. Exclosures that were approximately 100 m² in size and square in shape were constructed of 1.5 meter high “deer and rabbit proof” woven-wire fencing and metal “T” fence posts. Posts were sunk >0.5m into the ground and secured with adjustable bracing wires at appropriate angles. Control plots that were from 10 to 30 meters away from exclosure areas were also staked with the same dimensions at each site. The original intention was to subsample both exclosure and control plots with 1m² Daubenmire (1959) frames annually, recording plant species and relative percent occurrence.

These fences were intended to prevent entry by large mammals such as Dall's sheep, and also hares. To date, they have not fallen or been trampled, and so appear to be serving this purpose well.

Upon installation, notes were made about position of corners and lines (see diagrams by Jenna App, 1994 report this volume), and 4 "exclosure" and "control" Daubenmire subplots were sampled at each site. Plant species and percent cover were recorded for all biomass within each subplot. Field crews made subsequent visits to all 5 sites in 1995, and to exclosures #1 and #5 at Cirque Lakes in 1996. All vegetation sampling has followed the same general scheme; that is the use of 1m² Daubenmire plots within and outside exclosure fencing.

During September 1997, all field data were compiled, sorted, and entered into "Excel" spreadsheets as preparation for statistical analyses and to facilitate ease of access. Raw data were summarized in pivot tables on the Excel spreadsheets and graphed on bar graphs to illustrate percent composition of control vs. exclosure plots.

RESULTS

The primary products of work on the Charley River grazing exclosure project for 1997 were compilation of existing data, background information, and methodology, as well as data entry on Excel spreadsheets. All available information has been located and compiled in this binder. Data analyses include basic compilation of percent occurrence and species composition for exclosure and control plots at each of the 5 sites for all sampling dates (1994 through 1996). Due to time constraints, no further data analyses were completed at this time; however, recommendations for future monitoring appear in the discussion section below.

DISCUSSION

The Charley River grazing exclosures provide a unique opportunity to assess the long-term changes, biodiversity, and effects of grazing by Dall's sheep, on arctic steppe plant communities in the Charley River basin. The data collected from 1994 to 1996 should be viewed as the beginning of a long-term monitoring effort for these unique plant assemblages. The recommendation made by Linda Hasselbach in 1996 was an excellent one; that is for monitoring of the exclosures to continue, but to be done approximately every 5 years. In discussions with resource management personnel who implemented the grazing exclosure study (Kevin Fox and Penny Knuckles), I have been informed that these structures were always intended as a long term monitoring program; and that they were not erected with the intention of showing differences in plant composition, occurrence, or condition immediately.

Some exclosures do not appear to show visible changes in plant composition at this time; (Linda Hasselbach, Carol McIntyre, pers. commun.) however, my visual inspection of the Hanna Creek exclosure in 1997 did lead me to believe differences were showing at that location. The plant biomass present within the exclosure seemed to be greater than the surrounding area. This was due to the presence of a large amount of dead plant material (primarily grasses) present within the fencing. An extreme color difference (brown within and green outside) was visible at this exclosure site from ¼ mile away on the Charley River (the exclosure is visible as floaters pass by Hanna Bluff). This visual difference of course must be measured; however, these observations indicate that the effects of grazing and hence the treatment effects of the exclosures are most probably variable by site. Fortunately we have 5 exclosures at 4 sites: an excellent opportunity to monitor these biological changes.

I recommend that the 5 Charley River exclosures be sampled for vegetation composition and percent cover every 5 years, at a time during the summer months when plant phenology is optimal for plant identification (NPS botanists should be consulted to determine the best sampling times). Due to very high transportation costs, this is the most realistic sampling schedule. However, the Hanna Bluff exclosure is easily

accessible from the Charley River, and may be easily sampled more frequently by teams of field personnel floating the Charley. The Dewey Bluff exclosure has never shown intense signs of Dall's sheep activity (Kevin Fox, pers. commun.) and therefore is probably of a lower priority than the other exclosures. All of the grazing exclosures are accessible by hiking, but sampling all of them without the assistance of a helicopter would be time consuming. I recommend taking advantage of NPS personnel that may be out close to these areas on other projects for sampling these exclosures when unscheduled opportunities arise.

It is my opinion that these grazing exclosures can, with consistent sampling, yield a wealth of information about the arctic steppe plant communities present on the Charley River bluffs. The monetary investment required to sample these exclosures at least every 5 years, will in the long term be far outweighed by the field data collected. The NPS is in need of this important information to carry out its long term goal of maintaining the Charley River basin in its undeveloped natural condition for the enjoyment of future generations. Without field data about these unique plant communities, and information about their interaction with the Preserve's Dall's sheep populations, the NPS will be unable to monitor and therefore unable to protect these natural resources.

LITERATURE CITED

Daubenmire, R. 1959. A canopy coverage method of vegetation analysis. Northwest Sci. 33:43-64.