IDAHO DEPARTMENT OF FISH AND GAME

Jerry M. Conley, Director

Project W-160-R-21

Job Progress Report

WINTER HABITAT USE PATTERNS OF BIGHORN SHEEP IN BIG CREEK

Study I: Winter Habitat Use Patterns of Bighorn Sheep in Big Creek

Job No. 1: Develop a study plan and begin field work.

September 1, 1993 to June 30, 1994

By:

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PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE:	Idaho	**SUBPROJECT:**	Winter Habitat Use Patterns of Bighorn Sheep in Big Creek
PROJECT NO.:	W-160-R-21		
SUBPROJECT:	45		
STUDY:	I	**STUDY TITLE:**	Winter Habitat Use Patterns of Bighorn Sheep in Big Creek
JOB:	1		

PERIOD COVERED: September 1, 1993 to June 30, 1994

Job 1: Develop a study plan and begin field work.

INTRODUCTION

There have been alarming declines in the number of bighorn sheep (*Ovis canadensis*) in North America since the latter part of the nineteenth century. Wildlife specialists and conservationists have combined their efforts in analyses of possible measures to rescue the bighorn from its apparent plight.

Ernest Thompson Seton (1929) estimated the number of mountain sheep in North America to be between 1,500,000 and 2,000,000 in primitive times. In the 1920's, he estimated the population to be about 28,000 in the United States. Big game inventory figures for 1952 estimated the population of native sheep in the United States to be 17,500 (Smith 1954). Early losses of sheep were extremely quick and occurred across widespread areas. Entire herds were extirpated while others were reduced to a fraction of their earlier numbers (Smith 1954). Harvest regulations restricting or eliminating the legal take of mountain sheep were implemented. Many herds in remote and rugged wilderness continued to decline, becoming separated into small and isolated groups (Smith 1954).

The Idaho Department of Fish and Game (IDFG) recognized the declining status of sheep and initiated research projects starting in the late 1940's (Smith 1954). Major objectives of the investigations were to accumulate information on life habits and requirements of mountain sheep, to study and analyze factors affecting productivity, and to make accurate censuses as a basis for managing bighorns. The result was a management program designed to increase the number of bighorn within the limits of range capacities while permitting maximum harvest levels (Smith 1954). Forty years later, we are still in pursuit of these goals.

Bighorn population trend estimates in the Big Creek drainage have ranged from the low 60s in 1973 to 200 in 1989. A decline was observed between the years of 1989 and 1991. The population decline is possibly due to the lack of recruitment resulting from extremely low lamb survival (IDFG Job Progress Report 1993). Lack of survival, however, is not unexpected given the 7-year period of

below normal precipitation which has prevailed in the region. Heimer (1975) documented that when comparing two populations of mountain sheep, one on high quality range and the other on poor quality, ewes on the poor quality range had lower fetal weights and lower lamb crops. Observations during 1993 suggest that lamb survival was very high until September storms, when lambs were observed coughing, and a noticeable drop in numbers of ewes with lambs occurred. Lamb survival over the winter was stable until mid-March, when additional losses occurred (Peek pers. comm.). In prior years, lamb losses occurred earlier and low survival rates were apparent by the end of the summer (Yeo pers. comm.) These observations suggest that lamb mortality can occur during any season of year.

The proximate cause for the losses are obviously various combinations of pathogens. It is assumed that when conditions become adverse for a sufficient period of time, bighorn are unable to tolerate the parasite/disease burden because they probably are inadequately nourished. Poor nourishment in sheep can be caused from: 1) forage of poor nutritional quality, 2) insufficient quantities of forage, or 3) combinations of both.

This study will attempt to determine the forage sheep obtain by analyzing fecal material, the use of various habitats by radio-telemetry and bighorn activity budgets.

The research will respect limitations of wilderness and be carried out with the most sensitive and unobtrusive methods necessary to acquire essential data.

STUDY AREA

General Area

Research will be conducted in the Frank Church River of No Return Wilderness (FCRNRW) in central Idaho. The 932,000 ha FCRNRW is administered by the U. S. D. A. Forest Service (USFS). Idaho Department of Fish and Game (IDFG) manages the big game hunting seasons in those units found within the FCRNRW. Research will be conducted from the Taylor Ranch Wilderness Field Station, which is operated by the University of Idaho Wilderness Research Center. The study area is located on Big Creek, a tributary of the Middle Fork of the Salmon River.

Flowing eastward, the Big Creek drainage ranges in elevation from 2880 m to 1060 m. Topography is steep and dissected in the more arid lower canyon; the upper reaches vary from relatively flat rolling forest land and meadows to alpine basins and mountain peaks. Low elevations support grassland communities of bluebunch wheatgrass and Idaho fescue (*Festuca idahoensis*), forested communities of Douglas-fir (*Pseudotsuga menzesii*) and ponderosa pine (*Pinus ponderosa*), and shrub communities of mountain mahogany (*Cercocarpus ledifolius*), big sagebrush (*Artemesia tridentata*) and bitterbrush (*Purshia tridentata*). Higher elevations are dominated by forested communities of lodgepole pine (*Pinus contorta*), subalpine fir (*Abies lasiocarpus*), white bark pine (*Pinus albicaulis*) and Douglas-fir interspersed with wetland meadows, alpine meadows and rocky ridges.

Study Area

The study area includes all of Big Creek drainage from and including Cabin Creek drainage on the north side of Big Creek, directly south across Big Creek past Rush Creek Point to the ridge on the south side that separates Big Creek drainage from Soldier Creek drainage, then downstream to Big Creek's confluence with the Middle Fork of the Salmon River and back up to the head of the Cabin Creek drainage. The area is approximately 13 km by 20 km. The majority of research will be conducted on the north side of Big Creek between the drainages of Cabin Creek and Goat Creek, an area approximately 11 km by 8 km.

In winter, most big game use is concentrated on the north side of Big Creek within 2 to 3 km of the stream (Akenson 1992). Southern aspects provide maximum thermal benefits to sheep and earlier green-up of vegetation in spring than adjacent areas. South-facing slopes consist of rocky outcrops, cliffs, talus, grassy hillsides, benches, and forested areas at higher elevations. North-facing slopes primarily consist of a Douglas-fir/ninebark (*Physocarpus malvaceus*) habitat type, with chokecherry (*Prunus virginianus*) intermixed with small grassy areas and rock outcrops. The lowest temperatures, around -29^0C, usually occur in late December (Akenson 1992). Precipitation in the study area averages 30 to 38 cm per year. Snow depths are low, and southern aspects in the lower canyon remain snow free for much of the winter. Snow is deepest in late January and February (Akenson 1992). Elevations range from 2636 m to 1060 m. The study area is divided into four major habitats: grassland, mountain mahogany-outcrop, open Douglas-fir forest and talus. The grasslands consist of grassy benches and swales in the mid to lower elevations. Slopes of grasslands range from 0 to > 65 percent, and the ground surface is smooth with no rocky outcrops. Soils are moderately well developed, particularly in the grassy swales. Dominant vegetation in the grasslands include bluebunch wheatgrass, Idaho fescue, balsamroot (*Balsamorhiza sagitatta*), Sandburg bluegrass (*Poa secunda*), and cheatgrass (*Bromus tectorum*) (Akenson 1992). The mahogany-outcrop vegetation type contains steep, broken terrain with loose gravelly soils, outcrops, cliffs, talus slopes and draws with sparse vegetation. Mountain mahogany, sagebrush, bitterbrush, Gooding's gooseberry (*Ribes velutinum*) and wax currant (*Ribes cereum*) grow on the cliffs and rock outcrops with wheatgrass, cheatgrass, Sandburg bluegrass and cymopteris (*Cymopterus terebinthinus*) (Akenson 1992). Talus habitats are small rock slides devoid of any vegetation. Forested areas occur in both the upper elevations of the study area, and low elevation north-facing slopes. Douglas-fir/wheatgrass or Douglas-fir/pinegrass (*Calamagrostis rubescens*) are dominant habitat types found on upper slopes (Steele 1981).

METHODS

Field work was conducted from January through April. Six bighorn ewes were immobilized and fitted with radio transmitter collars. IDFG wildlife manager Mike Schlegel and IDFG veterinarian Dr. Dave Hunter immobilized sheep by slowly approaching a group until they were within 30-40m. When within range, a PNEU-DART containing 1ml of Carfentinal at a concentration of 3mg/ml, was shot into the hip of a selected ewe. The drug took affect in approximately 5-7 minutes.

Extreme care was taken to not dart sheep in terrain that could promote injury resulting from immobilization.

Immobilized sheep were hobbled and their eyes covered to reduce stress and expedite the amount of time needed for obtaining measurements and securing collars. Measurements recorded included horn lengths, total length, hind leg length, heart girth and estimated weight. Nasal and throat swab samples were taken, as well as blood and fecal samples which were sent to the IDFG veterinary clinic in Caldwell, Idaho for analysis. When measurements and samples were recorded, a radio transmitter collar was placed on the sheep.

Collars were Telonics Model 400 with a mercury tip-switch and mortality sensor installed. The tip-switch is used to determine activity budgets of sheep by changing the timing of the pulse width in relation to the position of a sheep's head. When a sheep's head is up, the transmitting pulse width is 1200 milliseconds, when down the pulse width is 800 milliseconds. If the collar does not move within 5 hours, the mortality signal starts, which has a pulse width of 500 milliseconds. Under normal conditions, collars should last for 4 years.

After processing of the sheep had been completed, the sheep were administered a reversal drug. Six ml of Naloxone or Naltrexone at a concentration of 50mg/ml was delivered. Half (3 ml) was delivered subcutaneously and the other half intramuscularly. This method insures sheep will not go back down by quickly metabolizing all the reversal drug before the immobilizing drug has been metabolized, thereby, reducing chances of injury or death.

Food habits are being studied by analyzing fecal material. Fecal samples were collected and sent to Colorado State University for analysis. Samples were collected approximately every 5 days from three sub-groups in the study area. Three pellets were randomly chosen from 15-20 randomly located piles of fecal material where sheep were located. Twelve composite samples were collected during the field season. Sheep were located visually and using radio telemetry.

Activity budgets of selected sheep were monitored using a Rustrak strip-chart recorder. A recording system was placed on a ridge above the Taylor Ranch and recorded activity of randomly selected individuals.

Determination of habitat selection was also attempted. Collared sheep were located using radio telemetry and confirmed by observation. Locations were recorded using the Universal Transverse Mercator (UTM) system in conjunction with 1:24,000 orthophotoquads. Information recorded at locations were: slope, aspect, elevation, vegetation type, group composition, distance to water,distance to mineral lick, distance to escape cover, time of location, and weather conditions. Four habitats will be delineated on 1:24,000 topographic maps using aerial photos and knowledge of the area. Habitats used will be grassland, talus, mountain mahogany-outcrop and Douglas-fir forest. Locations will be used to determine if habitats are selected for or against in accordance with their abundance.

RESULTS

Fecal analyses has not been returned from Colorado State University, therefore, food habits are not yet known. Activity of sheep seems to decline during nocturnal hours, however, lack of a large data set precludes any definite conclusions as to their time spent moving-feeding, resting, and standing alert.

Locations and observations of sheep indicate they may select grassland and talus habitats during the winter. More locations will be needed, and delineations of habitats completed, before these data can be inferred with any certainty.

DISCUSSION

Data collection during 1994 season was poor due to inclement weather and difficulty working within the confines of a wilderness area. Aircraft is the only access to the study area in winter, and low cloud cover precluded entry many times when IDFG personnel were available to dart sheep. Most sheep were captured the last of March disallowing for adequate data collection during the remainder of the field season.

In response to the lack of data, it has been decided to continue data collection through August. Food habits and habitat use data will continue to be collected, however, activity data may be discontinued.

Plans are to capture more sheep in the winter of 1994 beginning in November. This should allow for much better data collection in the winter and summer of 1995. That data and the results of the 1994 fecal analysis will be reported in the progress report for 1995.

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