

A REVIEW OF THE POTENTIAL EFFECTS OF WINTER RECREATION ON BIGHORN SHEEP

Kristin L. Legg, Outdoor Recreation Planner, Yellowstone National Park WY 82190

Abstract: Since 1994 managers in the Greater Yellowstone Area have assessed winter recreational use. Of particular interest to the public and park managers is how winter recreation impacts wildlife. A team of biologists from the Greater Yellowstone Area reviewed a number of wildlife issues and developed possible management guidelines to limit winter recreation impacts to wildlife. This paper is a review of the potential impacts of winter recreation to bighorn sheep (*Ovis canadensis*). Stresses from humans add to the natural stresses incurred by sheep during the winter and may cause displacement of bighorns from critical winter ranges, reduce productivity or limit foraging to times of day that require more energy. Some management suggestions were to limit the use of winter range by humans (possibly only allowing access on trails or roads), allow no dogs on winter range, expand the protection of current winter ranges, institute temporal regulation on human access and monitor activities on winter ranges to assess if bighorns are being displaced.

INTRODUCTION

Non-consumptive outdoor recreation increased substantially over the past few decades (Boyle and Samson 1985). The effects from winter recreational use to the natural environment are a point of disagreement among the public. The Greater Yellowstone Coordinating committee (GYCC) formed an interagency team of forest and park staff from the Great Yellowstone Area (GYA), to assess the following concerns: overcrowding, visitor conflicts and resource damage (snowmobile exhaust and noise, impacts to wildlife) in the document, *Winter Visitor Use Management: A Multi-Agency Assessment* (GYCC 1997). Biologists from the national forest, national parks and states in the GYA formed a working group in January 1997 to further address winter recreation impacts to wildlife.

The wildlife working group utilized a number of bibliographic reviews (with summaries and management recommendations) that pertained to how wildlife and the natural environment may be impacted by winter recreation activities (Bennett 1995, Biodiversity Legal Defense Foundation 1996, Caslick 1997). There was disagreement as to whether these bibliographic reviews contained information significant to winter use impacts on wildlife. Each biologist addressed different topics and prepared a short paper that described the possible impacts from winter recreation and management actions to prevent these impacts. These are being compiled into the report *The effects of winter recreation on wildlife: a literature review and assessment* (GYCC, in press). Bighorn sheep were of concern, since populations in the GYA and specifically Yellowstone National Park (YNP) were at lower numbers than in the past. Managers wanted to better understand how recreation may affect sheep and if this activity limited these populations.

Many populations of bighorn sheep in the GYA declined over the past 20 years (Meagher et al. 1992, Jones 1994, Legg 1996, Irby pers. Comm., Roop pers. Comm., Stewart pers. Comm.). Most recently the population in the Madison Range by Quake Lake, Montana declined during the winter of 1996-97 (Irby pers. Comm.). Disease, predation, and human impacts, such as destruction of habitat, recreation on seasonal ranges, and illegal hunting contribute to these unstable populations. Losses of habitat and migration routes are primary factors facing bighorn sheep management (Constan 1975, Horejsi 1976, Martin 1985, Reisenhoover et al. 1988, Envir. Prot. Fish Wildl. Serv. 1993). Many different stressors (natural and human caused) affect bighorn sheep during the winter. Limiting the impacts by humans during the winter may be important for maintaining bighorn populations of the GYA.

ASSESSMENT OF WINTER RECREATIONAL USE

In the GYA, the following winter recreational users and use may affect bighorn sheep: hikers, wildlife photographers/observers, ice climbers, hunters, snowshoers, skiers, snowmobilers, sled dogs, heli-skiing, and humans with dogs. In YNP, skiers have disturbed sheep at high elevation winter ranges, and the public has access year long to lower elevation winter ranges with main roads going through them. Recreation near or on bighorn winter ranges may affect sheep most during the rut, during severe winter conditions, and in the spring during the lambing season.

Limited information was available about the direct impacts of winter recreation on bighorn sheep. Literature has shown some impacts. In Montana, snowmobiles may have contributed to a decline in a bighorn population where they added to the natural stresses incurred during the winter (Berwick 1968). Hayden (1992) recommended that snowmobiles not be permitted within 1609 meters of goat habitat on the Beartooth Plateau, Montana. Intense recreational activities reduced desert bighorn occupancy of an area in the San Gabriel Mountains of southern California (Light and Weaver unpublished, in Hicks and Elder 1979). The distance between humans and bighorns, the elevation of the humans in relation to the bighorns, and bighorn herd size are important factors determining the reaction of bighorns when approached by humans (Hicks and Elder 1979). Boyle and Samson (1985) noted that climbing on or near bighorn escape terrain can affect the sheep. Thus, increased activities of ice-climbers in the vicinity of a bighorn winter range on the Shoshone National Forest concerned managers. Horejsi (1976) stated that improved access and more leisure time has increased recreational activities such as hiking with a dog and snowmobiling, which resulted in more terrain to wild sheep. Greater impacts resulted from people following the sheep onto their escape terrain.

Heli-skiing, where helicopters transport skiers to remote sites may have detrimental effects on bighorn sheep. Heli-skiing does not occur legally in the GYA. Studies of birds, mountain goats, wild sheep, deer, elk and wolverines showed impacts to wildlife from low flying aircraft. Exposure to helicopters and their noise increased energy expenditure, reduced fat accumulation, changed the animal's physiological condition, elevated heart rates, decreased survivorship, altered habitat use and distribution, interrupted torpor or hibernation, caused either acute or

chronic hearing loss, and/or caused groups to separate (Horejsi 1975, MacArthur et al. 1979, Knight and Cole 1995).

Several studies discussed the impacts of aircraft to mountain sheep and mountain goats. Goats did not habituate to repeated overflights. They remained alert and did not forage while the helicopter was present. Groups separated, and individuals were injured while fleeing the area (Cote' 1996). Cote' recommended a 2-kilometer buffer around mountain goat herds to decrease the harmful effects to the goats from helicopters. Similar impacts to goats were discussed in the environmental assessment of helicopter skiing in the Ketchum Ranger District, Idaho (USDA 1996). Joslin (1986) noted that helicopters used for seismic exploration affected mountain goats.

Bighorn sheep may be affected similarly. Jorgensen (1988) documented that bighorns abandoned winter range during the preparation of the 1988 Winter Olympics. Helicopter flights, avalanche blasting and human activity on ridge tops displaced the sheep to less optimal habitats. Sheep did, however, return after those activities ended. Bighorns were affected in the Grand Canyon by helicopter over-flights (Stockwell and Batemen 1991). In YNP helicopters and low flying aircraft cause bighorns to exhibit behaviors similar to those described for the goats (Ostovar pers. Comm.).

Recreational activities caused increased heart rates in bighorn sheep. (MacArthur et al. 1982) and/or displacement from preferred foraging areas into less optimal habitat (Horejsi 1976, Hicks and Elder 1979). During the winter, sheep typically forage during the warmest part of the day to minimize energy loss. Unfortunately, this time period is when humans recreate and are more likely to be in conflict with sheep. If sheep alter foraging activities, spatially and/or temporally, they increase their exposure to predators and add to the many stresses accumulated over the winter (USDA 1996). Decreased energy intake and increased energy expenditure may lead to reduced productivity, death by starvation, lowered resistance to disease and predation (Caslick 1993). Effects of human disturbance may be an additive factor in lowering the survivability in sheep (Horejsi 1976).

POTENTIAL EFFECTS

The following is a summary from the review literature of the potential effects to bighorn sheep from winter recreation.

- 1) Bighorns may limit their use to a small area of escape terrain or abandon high quality winter range, if it is used heavily by humans. These limitations will decrease available habitat and increase exposure to predation.
- 2) Recreation-caused stress during critical winter months may lower bighorn survivability.
- 3) Human use on the range during the breeding season could interfere with breeding.

- 4) During the lambing season, recreation could displace ewes into less optimal habitat, exposing lambs to predators and harsher weather conditions.
- 5) Developments along migration corridors or on winter ranges may decrease the already limited habitat available for the sheep.
- 6) If bighorns are unable to forage during the day because of recreationists, the sheep will require more energy to forage during evening hours, when it is colder.
- 7) Heli-skiing and other overflights may prove detrimental to sheep by increasing energy expenditures, reducing fat accumulation, changing an animal's physiological condition, elevating heart rates, decreasing survivorship, altering habitat use and distribution, causing either acute or chronic hearing loss, and causing groups to separate.

MANAGEMENT GUIDELINES IN REFERENCE TO WINTER USE

From the review of the available literature, management guidelines were suggested. Management guidelines may vary by site, depending on terrain, accessibility, and the type of recreational use.

- 1) Limit the approach to the critical areas of sheep habitat. To help eliminate some of the stress and habituation possibilities associated with humans, YNP implemented a closure within 100 meters of escape terrain on a winter range in northern Yellowstone.
- 2) If winter range is used heavily by people, disturbance may be minimized by limiting human activities to roads or trails (MacArthur et al. 1982).
- 3) Allow no dogs on any sheep winter range (MacArthur et al. 1982). If allowed into an area, they must be on a leash (Harris et al. 1995).
- 4) Protect and expand remaining bighorn habitat and ensure integrity of migration corridors.
- 5) Provide special protection during brief critical periods, such as during breeding, lambing and severe winter weather (Horejsi 1976, Boyle and Samson 1985).
- 6) Monitor activities, such as ice climbing, wildlife photography/observation or hiking that occur on lower elevation winter ranges. If bighorns are displaced, the area may need to be closed.
- 7) Skiing, snowmobiling, mountaineering and snowshoeing will most likely only affect bighorns wintering at higher elevations. The encounters between these recreationists and bighorns may be infrequent enough that there would be little to no impact to the animals. If use increases at these higher elevation ranges, the managers will want to monitor the situation.

- 8) Depending upon the site, managers should implement a 1609 meter buffer from snowmobiles near bighorn sheep escape terrain (Hayden 1992).

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