Noatak

National Park Service
U.S. Department of the Interior

Noatak National Preserve, Alaska

Hoofin' It! Dall Sheep Population Size

Population Size

A population is defined by all of the animals of a single species that live and raise their young in a specific area. In Alaska, the Dall sheep population is currently estimated to be about 70,000 animals. Sheep live in mountain ranges around the state including the Brooks Range, the Alaska Range, the Wrangell Mountains, the Chugach Mountains, the Talkeetna Mountains, and on Kenai Peninsula.

Dall sheep populations in the Baird Mountains of northwestern Alaska declined substantially during the early 1990's following two severe winters. Population estimates of adult sheep declined 51%, from 811 to 383 between 1989 and 1991.

Wildlife biologists conducting population counts found that the sheep population remained low throughout the 1990's. They also observed few lambs during aerial surveys conducted from 1991 to 1994. These declines resulted from the poor nutrition, increased predation, and severe winter conditions (Adams et al., 1999).

Factors Influencing Animal Populations

Animal populations change over time as births add individuals to the population and deaths subtract individuals from the population. Populations also change when individuals emigrate(leave an area) or immigrate (move into an area).

Animal populations have the potential to grow in an exponential fashion. This growth can be affected by a number of factors, called limiting factors. Disease, habitat destruction, predators, weather, food availability, pollution, and human interference can all be limiting factors that affect Dall sheep populations. A limiting factor either slows the growth of an animal population or causes the population to decline. Changes in wildlife populations over time are usually a result of a combination of limiting factors.

Every population is limited by the amount of available habitat. The amount of quality habitat is the factor that ultimately sets the upper limit on the size of a population. If part of the habitat is not of quality and/or limited, then the growth of that population may also be limited. For example, it could be possible that one winter the lower elevation grasses and shrubs that the Dall sheep eat be buried under 5 feet of snow. It may be difficult for the animals to forage and get enough food so all the sheep move into a smaller area or only part of their habitat to feed. After a period of time, they eat all the available vegetation and may starve.

Predators are often a major limiting factor on the growth rate of a prey population. Dall sheep predators include wolves, bears, and eagles. Prey populations can also limit the size of the predator population if they are the only source of food available.

Human activities may also limit populations. Humans can directly limit populations by harvesting (hunting) or they can indirectly limit populations through pollution, habitat destruction, or inadvertent disease transmitted from domestic animals.

Healthy Populations

Every population has a maximum size that it can reach before it exceeds the available habitat. This maximum number is the carrying capacity of an area. If a population exceeds the habitat carrying capacity, the population will decrease due to limited resources, especially food. Healthy wildlife populations fluctuate from year to year as the limiting factors and carrying capacity of the habitat change.

A classic example of such fluctuations in Alaska are the cyclic populations of lynx and hare. The hare populations grow when food is plentiful. The lynx populations then grow from eating the numerous hare. The hare populations then shrink as they eat the food and are eaten by the lynx. Then the lynx populations shrink and the plants grow back, and the cycle starts again. The populations other large mammals, such as moose, wolves, bears, caribou, and sheep, also go have cycles, where the population size grows and shrinks over the years.

Population age structure and its importance: The age structure of the sheep population refers to the number of sheep in each age class. An age class or cohort is made up of all the sheep born in any given year. For example, sheep born in 1998 as lambs are a cohort. In 1999, this cohort will be 1 year old and so forth. The age structure of the population depends on the number of sheep in each cohort. The number of sheep remaining in a particular cohort from one year to the next is dependent upon their survival rate. As a cohort grows older, and sheep have been lost to hunger, predation and other limiting factors, the cohort shrinks.

A typical age structure for sheep would have the greatest numbers in the younger age classes and fewer numbers in the older age classes. For sheep, life spans vary between ewes and rams. Ewes may live to be 17 years old, whereas rams reach only 10-12 years of age.

Because a ram's horns grow in a spiral throughout their lives, they can be used to estimate their age. The horn grows up and back from the skull and then curls down and around and up again. A full curl is when the tip of the horn has circled all the way around to pass the spot where the horn grows out of its head (don't worry the horn spirals away from the skull, so the tip of the horn doesn't poke the skull). A three-quarter curl is when the tip of the horn has curled up, back, and down and is ready to grow up toward the horn base again. If you imagine the horn starting at the 3 on a clock, and growing backwards to 12 then to 9, a three-quarter curl would be when the horn tip gets to the 6.

Rams generally reach 3/4 curl at 7 years old. It takes another 2.5 to 3 years to reach full curl, around 10 years old. The average number of full curl rams counted was 18 for 1986-1995; however the three year average for 1996-1998 is 48. The 1999 count was only 27. So during the years 1996 to 1998 there was a large cohort of older rams, and then by 1999, close to half of the 10 year old rams died. This die off may not be surprising, since rams don't usually live past 12 years.

Dall sheep populations in the Baird Mountains have many more ewes than rams. This happens for many reasons. The number of male and females lambs are approximately the same, so the difference has to do with how many ewes survive and how many rams survive. Even though they rarely die directly from fighting with other males, the rut (male competition for females in the fall) takes a heavy toll on the rams. They are exhausted and often injured, leaving them more susceptible to starvation, predation and illnesses such as pneumonia.

The effects of this are shown by the fact that rams only live until about the age of 10-12, and ewes closer to 17. Another factor is hunting by humans. Hunters prefer to hunt the rams with their large horns than the females. In some areas where moose are hunted heavily, the male:female ration can go from 60-70:100 all the way to 5:100!