



Hoofin' It! Wildlife Management of Dall Sheep

Introduction to Wildlife Management

Wildlife Management focuses on managing the interactions between people and wildlife. In fact, wildlife biologists spend more time managing the activities of people than they spend working with animals.

Wildlife is highly valued by all cultures in our society. People value wildlife as an important resource to use. Just look around you. Much of the food that we eat comes from domestic animals that are descended from wild species (e.g. the extinct aurochs is the ancestor of the modern cow).

Some of the clothes we wear are made from both domestic and wild animals (e.g. leather, fur garments). People also value wildlife as a source of inspiration: much of our art, literature, and music focuses on wildlife. Since we are so closely tied to wildlife, it is no wonder that we can have a significant impact on wildlife species, especially their abundance and habitat.

In this unit, we will take a closer look at the issues that surround our relationship with Dall sheep, especially how wildlife managers work to minimize the harmful effects of our resource use on wildlife populations.

What Affects Sheep Populations?

Several factors can affect sheep populations: habitat loss, overhunting, introduced disease, malnutrition, and predation. Malnutrition and predation are referred to as natural factors whereas the others are human-induced factors.

In North America, wildlife biologists are helping wild sheep populations by correcting and mitigating human-induced factors. Wild sheep need a place to live and food to eat, so biologists improve or enhance habitat by prescribing wildfires that increase the native plants that sheep eat. They provide safe travel corridors between habitats that are fragmented

by human activities like agriculture and urban development. Wildlife managers regulate the number of animals that can be killed by hunters to ensure that the wildlife resource is conserved. Remember that other animals, predators, also eat wild sheep, so humans have to learn to share the resource with other animals too.

In national parks, wildlife managers observe the natural factors that affect wildlife populations and attempt to minimize the impact of humans while recognizing the important relationship that people have with animals.

Dall Sheep Management in Northwest Alaska

An important wildlife management issue in northwest Alaska is the declining Dall sheep population in the western Baird Mountains. Following two severe winters in the early 1990's, the population dropped to less than half its

previous size. Without enough sheep to support harvest, wildlife managers closed sheep hunting seasons for seven years. This was a classic wildlife management issue - managers had to decide what the effect of hunting would be and

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make decisions regarding future hunting. The decision to close the season was difficult because wildlife biologists did not completely understand all of the factors that caused the population to decline.

To aid managers in the future, wildlife biologists needed more information on the abundance of Dall sheep and the natural factors that affect their numbers. They planned a research study, which began in the spring of 2000, to provide answers including lamb productivity and survival, adult survival, nutritional body condition, disease, and movements throughout the year. The biologists will use radio collars on approximately

50 sheep for 3 years. Radio collars will allow the researchers to follow individual sheep to determine how long they live, how many lambs they have, and where they travel throughout the seasons.

The second objective of the study is to find the best way to count the sheep each year. The research team will evaluate several counting methods. Biologists anticipate that the study will improve their ability to monitor the sheep population and gain a better understanding of Dall sheep population dynamics, how the population changes over time.

Wildlife Research Techniques

The first step in designing a research study is to think carefully about the study objectives. What would you like to achieve by completing the study? NPS wildlife biologists wanted answers to the following questions about the Dall sheep population:

- How many sheep are there?
- How long do they live?
- How do they die?
- How many lambs are born each year?
- How many lambs survive?
- Are sheep healthy?
- What causes the population to decline or increase?

The next step in designing a research study is to decide which research techniques or methods should be used to achieve the study objectives. How will you answer your questions?

Capturing and Radio-Collaring Sheep

A radio collar consists of a radio transmitter attached to a collar. The collar is put around the neck of an animal just like your dog's collar. Collars used for young animals can expand as the animal grows.

Other collars, called break-away collars, deteriorate slowly with sunlight and fall off the

The biologists for this study chose to use two important research methods: radio collars and aerial surveys, which are described in depth below.

Since biologists cannot study every animal in a population, they select a random sample of the population — a smaller group of animals randomly selected from the total population. Biologists study the animals in the random sample and assume that they represent what is happening to all of the sheep in the population.

For example, if 10% of the sheep in the sample are killed by wolves each year, biologists assume that about 10% of the total population of sheep is killed by wolves each year. Samples allow us to learn about populations without studying every animal in the population.

animal after several years, so they do not have to wear the collar forever. The radio transmitter is inside a sealed metal box attached permanently to the collar (picture). A short, flexible antenna sends out a very high frequency radio signal every second for up to 3 years. The frequency is so high that neither animals nor people can hear it. Once an animal has a radio collar, researchers

Capturing and Radio-Collaring Sheep, continued

can return any time and find the animal to study it. Using a special radio receiver, researchers fly in small airplanes until they pick up the radio collar's signal. Each collar has its own unique frequency, so researchers can know which animal they are tracking.

Locations of sheep are recorded by GPS (Global Positioning System) in latitude and longitude coordinates. The GPS is an electronic receiver that uses signals transmitted by satellites to calculate the geographic location of the receiver. The locations of sheep are plotted on maps produced by computers with a GIS, or Geographic Information System. Researchers look at where sheep live relative to elevation and vegetation types. They also look at movements of sheep across the landscape throughout the seasons.

Today, new technology allows researchers to also use satellite transmitting radio collars. Satellite radio collars look like the conventional radio collar, but rather than broadcasting a radio signal to a receiver in airplane, they send their signal directly to a satellite orbiting 850 km (527 miles) above the earth.

The satellite information is processed mathematically and the location of the animal is sent directly to the researcher each day by electronic mail. This helps the researcher because rather than flying several times a year to locate the sheep, they find out their location every day, just by checking their email. Both types of collars are being used on this project. So the next question is: How do you radio collar a wild sheep?

Wildlife biologists use a variety of methods to capture wild animals (e.g. tranquilizing and physical restraint). To capture Dall sheep, wildlife veterinarians have determined that the best

method is to physically restrain sheep without the use of immobilizing drugs (that make them unable to move) or tranquilizers (that make them sleepy). Biologists locate sheep to capture by flying small airplanes.

Once a sheep is located, a helicopter swoops in, and a trained biologist fires a net out of a modified gun (picture) and entangles the sheep (picture). After the sheep is entangled, the helicopter lands next to the sheep and animal handlers blindfold the sheep to keep it calm and then tie its legs together (hobble) the sheep so it cannot run away. Sheep are captured during March when they are at lower elevations and in less steep terrain; that way, sheep are less likely to fall and it is easier to land a helicopter.

First, the radio collar is attached to the sheep, and biologists ensure a good fit allowing for growth and seasonal weight changes that affect the animal's neck size. While the collar is being attached, another biologist takes body measurements, weighs the sheep, and draws a blood sample for later disease screening and a pregnancy test for ewes. Biologists age each sheep by counting the number of growth rings on a horn (picture).

Each complete ring represents one year of the sheep's life. When all of the information is collected, the sheep's blindfold and hobbles are removed, and it moves on with its new radio collar that will allow biologists to follow it during the coming years. Biologists will locate each sheep at least one time each month using an airplane and the signal transmitting from the radio collar.

Counting Sheep - The Aerial Survey

The most basic method to determine how many sheep are in a population is to simply count them. Unfortunately, this is harder than it sounds. Conducting research in the remote areas of Alaska is difficult and expensive. Most park lands have no roads and with millions of acres, walking to conduct research is virtually impossible. So, the result is that most biologists use small airplanes to conduct aerial surveys to count animals. You would think that a white sheep on a brown or green slope would be easy to see, but you would be surprised how hard it is to spot anything from an airplane going 80 miles per hour.

To conduct a census of the sheep population, biologists are using a population estimation method called minimum counting with correction. Biologists draw survey count unit boundaries on topographic maps where each observer will look for sheep from small airplanes. In the Baird Mountains, we have 18 count units that encompass nearly 1,980 sq. km (765 sq. miles). Aerial surveys take place in early July after all of the snow patches have melted, and lambs are about 1 month old.

Experienced pilots fly biologists across the mountainous terrain to look for sheep bands within each count unit. When sheep are located, the biologist records the total number of sheep sighted, the number of ewes and lambs, and the number and horn-size classes of rams. Pilots record the locations with an onboard GPS. Biologists total the number of sheep seen in all 18 count units to get a minimum count of sheep in the population. Because biologists cannot possibly see every single sheep, some sheep may

be in rocky terrain or they may be dirty and just hard to see, they have to adjust the minimum count to obtain a final population estimate, by adding what is called a sightability correction factor.

An estimate is a best mathematical guess of the true number of sheep in the population. Using the radio-collared sheep as an index, if the biologists saw 90% of the radio-collared sheep, then they will add 10% to the minimum count to get the final population estimate. This describes the simplest population estimation method. For the Baird Mountains research project, biologists are also using a more complex estimator called mark-recapture.

Mark-recapture is another population estimation method, like minimum counting with correction, but it uses the radio-collared sheep to actually estimate the population size. Biologists initially mark a sample of sheep with radio collars (in this study that means about 50 sheep). The recapture is actually more appropriately a sighting of a marked animal. Each day that a researcher flies during the aerial survey and sees a marked sheep, this is considered a recapture for the estimation procedure.

After multiple “recaptures”, the biologist can use a mathematical formula that compares the number of marked (radio-collared) sheep to the number of unmarked sheep seen over the course of several days to calculate a population estimate. The “Counting Sheep” student activity will demonstrate more clearly how the procedure works.

Making Decisions

Using the aerial survey and the radio-collared sheep, biologists can begin to answer the questions posed earlier. The annual, aerial survey in July will tell us how many sheep are in the population (our estimate), and we can compare this to previous years to determine the population trend. Using information from captured and radio-collared sheep, we can determine whether sheep are nutritionally healthy based on their body weight and blood disease screening.

We can tell how many ewes are pregnant and whether we should expect to see a healthy number of lambs in the following June (remember they were pregnancy tested in March). We'll know the average age of sheep in the population based upon the radio-collared group. Over time we will be able to see what the life-span of a sheep is and what causes their death.

Why Do Dall Sheep Matter?

Although that is an easy question to ask, there are many different answers. First, sheep are an important part of the arctic ecosystem. They are food for predators, especially wolves. Sheep are important to both consumptive and non-consumptive users. Consumptive users are typically hunters.

For native subsistence hunters, sheep are an important food and cultural symbol. For sport hunters, both the meat and trophy-value of large ram horns are important. For consumptive use of sheep, there needs to be an adequate population size to support hunting. Remember that humans are part of the interconnected ecosystem and

All of these questions can be answered by using some simple research techniques, but this is not the end of the story. What do we do with all of this information? Remember that wildlife management is the process to manage the interactions between people and wildlife. The issue in northwest Alaska parklands is the declining sheep population and the demands of many people who use the sheep.

In northwest Alaska, local residents serve as advisors to Federal and State wildlife managers. Because the issues are complicated and often involve many people with different ideas about sheep and their value to people, the NPS regulates the use of sheep in consultation with interested users. Wildlife managers attempt to blend science and traditional ecological knowledge to enhance wildlife conservation while respecting the diverse values that people place on the sheep resource.

their activities affect the entire ecosystem. Wildlife managers must have the information to make decisions about hunting.

Non-consumptive users may include, photographers, hikers, and floaters who do not use sheep as a resource, but instead, view them as a symbol of wilderness and are therefore satisfied knowing that wild places still exist where sheep can be part of a natural ecosystem.

Like consumptive users, non-consumptive users expect that wildlife managers are making decisions that will ensure the continued existence of healthy sheep populations.