Thinhorn Sheep

See Also

Dall (white) and Stone (dark) sheep are two subspecies of thinhorn sheep found in the Yukon. A cross between them, called Fannin sheep, is also found in the territory. Thinhorn sheep are very traditional users of **winter ranges, lambing areas, rutting grounds, and migration corridors**. All these habitats are key because they are used traditionally, and are limited in extent.

Generally, winter ranges are found on steep, south-facing slopes where strong winds and sunshine prevent snow accumulation. In early winter sheep are not significantly restricted by snow because it is usually soft enough to allow movements and cratering. As winter progresses the snow becomes wind-packed, and sheep are confined and concentrated into smaller snow-free, wind-blown areas where forage is available.

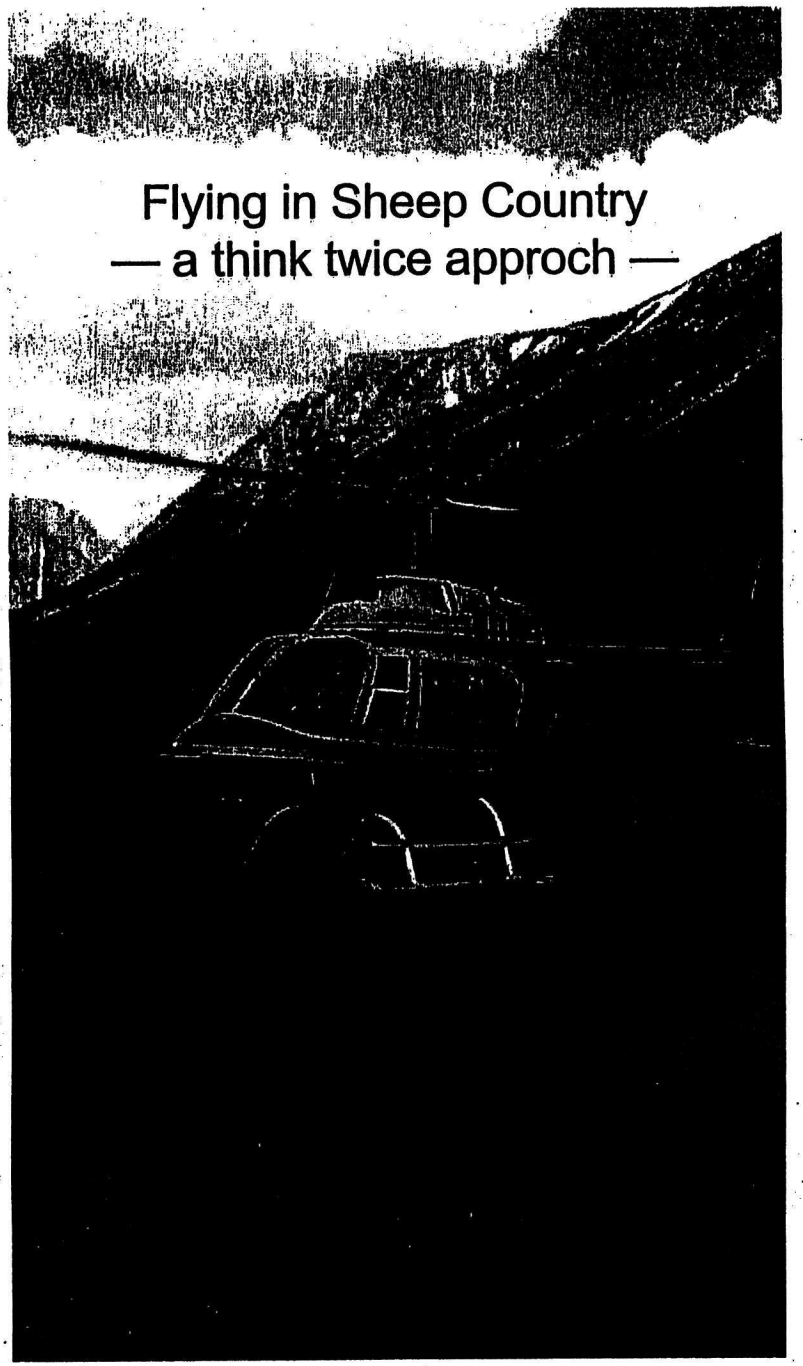
Lambing, which occurs between May and early June, is a key time of year for ewes and lambs. During lambing, they are vulnerable to predation, primarily by wolves, coyotes, grizzly bears, and golden eagles. To avoid predators ewes will give birth on steep cliff faces. These areas are used traditionally for lambing but may also be used as predator escape terrain during other seasons.

Small groups of sheep use rutting, or mating, grounds in early winter. The locations and physical characteristics of rutting grounds are not well known, but the behaviour itself is more significant than the location. Preventing the disturbance of these rutting groups is important to ensure successful reproduction. More research is required to better define the physical attributes of rutting grounds.

Sheep travel along well-worn migration routes to access summer and winter ranges, mineral licks, and other key habitats. If there is a significant disturbance along these migration trails or they are destroyed, sheep populations could be prevented from reaching important areas within their total range.

Key Area Map Label Symbols

Key Area Type	Silhouette	Season	Function
Winter Range		w	R
Lambing Area		sp	X
Rutting Area		ew	B
Migration Corridor		sp, f, u	C



Flying in Sheep Country
— a think twice approch —

Let's get to the point — helicopters disturb
Dall sheep.
So this brochure outlines eight simple things that you
can do to give the sheep
the space they need.
We call it the
Think Twice Approach.

Flying in Sheep Country
— a think twice approch —

1. Think Twice about your route.
2. Think Twice about how many flights you take.
3. Think Twice about how close you get.
4. Think Twice about the time of day you fly.
5. Think Twice about the season when you fly.
6. Think Twice about the sounds you are making.
7. Think Twice about how high you fly and your angle of approach.
8. Think Twice about where you land.

Think Twice — It's just plain good manners.
You may be far from your home,
but you're close to theirs.

1. Think Twice about your route.

It might not matter to you which way you fly, but it might matter a lot to the Dall sheep. If you can go around the site — even if it takes a little extra time — why not do it.

❑ Plan your route based on what the biologists call 'sheep distribution'. If you can go around them at a distance that is great enough to limit disturbance, go around them. Better still, try to fly a route that places a ridge between the helicopter and sheep.

Sheep far from the shelter of cliffs are more likely to run to safety than are sheep on a cliff. They are also more likely to run greater distances to get to the cliff shelter.

When Dall sheep can't see or hear you, you're less likely to disturb them. We know this doesn't help much if your customers are tourists who want to see Dall sheep, but it's definitely something to consider when you fly in exploration groups.

What does it mean for the sheep? Your flight route could affect their feeding and resting patterns. They might see your helicopter as a predator and run.But even if they don't 'run', you are likely to disturb them.

2. Think Twice about how many flights you take.

Dall sheep don't ever become completely accustomed to helicopters. Some sheep respond as strongly to the last flight as they do to the first.

❑ Biologists use the term 'habituation' when animals become so used tohuman activity that the activity no longer appears to bother them. In some experiments over a 12-hour period, a number of sheep did become less likely to flee, but remember, they may still be disturbed even if they don't show it by running. They become more alert and this increased vigilance is an interruption to their normal activities such as feeding and sleeping.

'Vigilance' is the term biologists use to describe animal behaviour when animals interrupt activities such as foraging to stand with their head above their shoulders and scan the surroundings.

3. Think Twice about how close you get.

The bottom line is that the closer you get, the greater the disturbance that you create and the faster the Dall sheep will flee.

❑ The biologists call this the 'set-back distance'. It's another variable that you will be able to control in many cases. Try to stay about 3.5 km away from the sheep — that's the distance when the sheep will first react.

And here's another bit of information: As the size of the Dall sheep group increases, the possibility also increases that one member of that group will spot the helicopter from a greater distance. When the sharp-eyed sheep runs, the rest of the sheep take the cue and run too — even if they haven't seen the helicopter.

> Remember, when Dall sheep run from a perceived predator — that's you — they're wasting the energy they need to survive. Even if they 'only' become more vigilant, you're still disturbing them.

Some people think this is exciting; a whole group of Dall sheep fleeing for safety. But most, even 'paying tourists' will likely respond to the common sense of a *Think Twice* approach — good binoculars can give them the view they came for and lessen the effects of the overflight on the animals below.

4. Think Twice about the time of day when you fly.

❑

Flights before 8 a.m. stand a better chance of not disturbing sheep at mineral licks. If you *must* make a lot of flights in a short period of time, try to concentrate them into a single day, rather than spreading the disturbance over several days.

Finally, you should also be aware that flights during the afternoon when Dall sheep are resting and chewing their cud may be more disruptive than flights when they are feeding.

5. Think Twice about the season when you fly.

❑ Most of the exploration-related flights in the Yukon take place between May and September. When you know where Dall sheep groups are located you can plan your route to avoid them, especially during lambing season which can run as late as the third week of June in some areas of the Yukon.

6. Think Twice about the sounds you make.

❑ Helicopters are noisy and nothing will stop that, but, once again, with as much distance as possible between you and the Dall sheep, you will lessen the effects of the disturbance you cause.

For caribou, the cumulative effects of noise from overflights seem to have the greatest effect on the resting pattern. Although the number of resting bouts increased, the duration of these bouts decreased as the number of overflights on the same day increased. Biologists want to do more investigations to see if this trend applies to Dall sheep too.

7. Think Twice about how high you fly and your angle of approach.

Dall sheep are more likely to run to escape from a helicopter as it comes into their direct line of sight.

❑ The more space you put between you and the sheep, the better. This can mean flying either very high or very low relative to their position.

Dall sheep are also more disturbed by direct approaches by the helicopter. Maintain an angle rather than flying directly at them, and try to fly from below so that you don't interfere with their upward escape route.

8. Think Twice about where you land.

❑ Ridges provide a natural visual and sound barrier between the helicopter and the sheep.

Remember, it's always better to approach animals from below — whether you're flying or hiking. Their safest escape route is always 'up'. If they are forced to run downhill, they could easily tumble and break a leg.

Flying in Sheep Country
— a think twice approch —

Why bother?

Aircraft disturbance of Dall Sheep and other wildlife is a growing concern in the Yukon for two reasons.

1. Mineral exploration occurs in mountainous, roadless areas which require aircraft (often, helicopter) access (These areas often contain the year-round ranges of sheep and goats, or the summer/rutting ranges of caribou).
2. An air-craft based tourism industry ('flight-seeing' and flying to remote areas for outdoor adventures) is growing rapidly.

The Yukon Department of Renewable Resources, Fish and Wildlife Branch, began work in 1995 to document the effects of helicopter flights on Dall sheep. Preliminary results of the investigation (that included field work, a review of published research and an analysis of data) showed the various ways in which helicopters can affect Dall sheep. The papers produced in the course of this work are available from the Fish and Wildlife Branch.

Fixed wing aircraft may not cause sheep to react as strongly, but no matter what type of aircraft you fly, if the sheep change their behaviour, you're too close.

Both the Fish and Wildlife Branch and the author of the papers acknowledge that the field work was limited, but they feel that the findings are

significant and contribute to a better understanding of what people can do to minimize the effects of aircraft on Dall sheep populations.

The information offered here is for helicopter pilots, mining companies planning to undertake exploration activity, tourism operators and wilderness tourism guides and their customers. All of these people have a role to play in protecting Yukon wildlife.

The Fish and Wildlife Branch hopes that the information it provides here — however basic — will contribute to a broader knowledge about the importance of developing proper approaches to activity in animal habitat areas.

As we learn more about how aircraft affect wildlife — in the Yukon and elsewhere — the suggestions in this publication may change.

Think Twice — it's just plain good manners.

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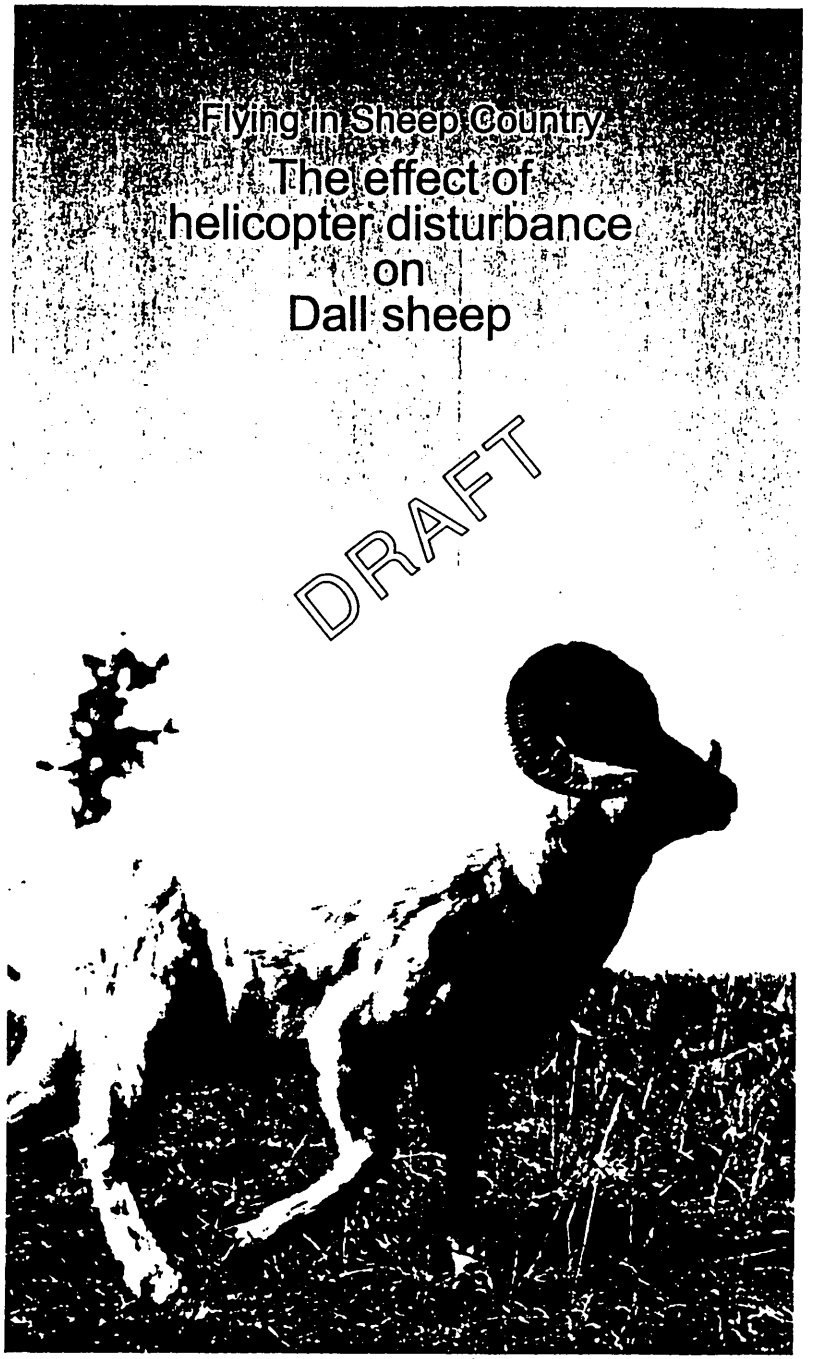

Introduction:

The Yukon Department of Renewable Resources, Fish and Wildlife Branch commissioned an investigation into the effect of helicopter disturbance[1] on Dall sheep.

Field work, was conducted in two areas:

- in the Killermun Lake region between May and July 1995 in two field trips — one in the lambing range and one in the primary summer range; and
- in Hoge Pass in Kluane National Park from mid June to early August 1997.

Although the scope of the work was limited by time and money, the consultant produced several papers about his findings. These papers are:

- Dall's Sheep of the Killermun Lake Region: ecological and behavioural Data in relation to mineral exploration (1995);
- Hypotheses and preliminary experimental designs for investigating impacts of helicopter disturbance on Dall's sheep (1996);

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[1] The Fish and Wildlife Branch also conducted a study to observe sheep reactions to fixed-wing overflights. This study was done in the Burwash Landing area. It was undertaken when the people in the area expressed concern about sheep reacting as strongly to fixed-wings as they do to helicopters. Their concern is based on the fact that they are located on a major flight path for small aircraft travelling to and from Alaska and because outfitters in the area use fixed-wing aircraft to transport their clients. Data from this study contributes to the information collected from the helicopter studies, thus increasing the sample size. The paper developed as a result of this study is Behavioural responses by Dall sheep to overflights by fixed-wing aircraft by Alejandro Frid, November 1999.

- Responses to helicopter disturbance by Dall's sheep: determinants of escape decisions (1998 — the original contract report that outlines management considerations);
- Short-term effects of helicopter overflights on activity budgets of Dall's sheep (February 1999);
- Short-term responses by Dall's sheep to multiple helicopter overflights occurring within 12-hour periods (March 1999 — year); and
- Fleeing decisions by Dall's sheep exposed to helicopter overflights (revised November 1999).

The Fish and Wildlife Branch and the contractor hired to do the studies, Alejandro Frid, acknowledge that the field work was limited, but they feel that the findings are significant and offer precise information about what can be done to help minimize the effects of aircraft on sheep populations in the Yukon.

Vigilance is the term biologists use to describe the behaviour of animals who interrupt activities such as foraging to stand with their head above their shoulders and scan the surroundings. Vigilance is largely an anti predator behaviour.

The project was initiated to gain a broader understanding of sheep behaviour so that people undertaking mineral exploration or conducting wilderness tours that involve the use of aircraft, will have the information they need to conduct their

business in a way that sheep populations remain as undisturbed as possible. Specifically, the Killermun Lake study was triggered by concern about mining activities in the area. The Hoge Pass study was done to develop study hypotheses further.

This booklet is a companion piece for the brochure *Flying in Sheep Country — a Think Twice Approach* to minimizing helicopter disturbance on Dall sheep.

It summarizes investigations by the Yukon Department of Renewable Resources, Fish and Wildlife Branch, into the effects of this kind of disturbance. It identifies the study sites and outlines how data was collected. It also summarizes what the studies show.

Who should read this booklet?

- wilderness tourism guides/companies;
- helicopter/fixed wing aircraft pilots;
- people associated with mining companies planning to undertake exploration activity;
- tourism operators and their customers;
- management boards; and
- anyone else interested in Dall sheep or in undertaking wilderness activities.

What is disturbance?

Disturbance is any activity that interrupts the regular behaviour and routines of animals. In the case of the Fish and Wildlife Branch studies, Dall sheep were studied to gauge the effect of helicopter activity on their routine ruminating and feeding.

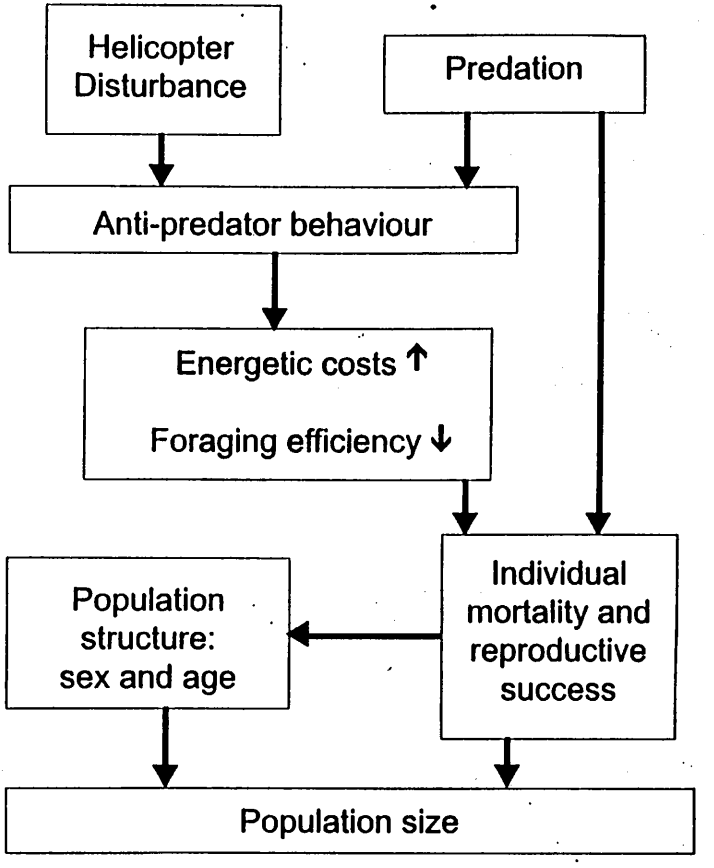
Disturbance that causes Dall sheep to run is the easiest to observe. But a move of even a few metres means an interruption in their patterns. Similarly, increased vigilance is also an interruption to the normal behaviour of Dall sheep.

The study sites —

The 1995 study was conducted in a roadless area of The Ruby Mountains in southwest Yukon, west of Killermun Lake.

The Hoge Pass area in Kluane National Park.

Helicopter disturbance vs predation



This conceptual model compares the effects of helicopter disturbance and predation on individual behaviour and population dynamics. While only predation kills individuals directly, both helicopter disturbance and predation affect anti-predator behaviour. An increase in anti-predator behaviour results in reduced foraging efficiency and increased energetic costs. This affects body condition and reduces reproductive success. Increased anti-predator behaviour and direct predation interact to affect population dynamics.

The southeast slopes of the mountain are the lambing and primary spring range of Dall sheep. These slopes are a mosaic of large cliffs, small bluffs, extensive areas covered by tall and dense vegetation including willow, poplar and scattered spruces. The area also includes open slopes without cliffs or vegetation cover.

The primary summer range is located on the ridge tops and in the open meadow areas of the west and north slopes of the mountain.

The study author observed important mineral licks in the lambing range but not in the summer range.

In 1997, field work was done near Hoge Pass in the Kluane National Park. The area consists of high alpine meadows and talus slopes on the flanks of serrated pinnacles. Rocky outcrops and small valley glaciers are interspersed throughout.

Collecting data:

Killermun Lake study: Information was collected through 22 censuses conducted over 21 days in May and June, 1995.

Counts were done from five vantage points along the valley of Killermun and Shutdunmun Lakes. Observers used mountain bikes and canoes and walked to move between vantage points. Each count took four to five hours.

Hoge Pass study: Information was gathered over 40 days at Hoge pass between mid June and August, 1997. The sheep were observed from the ground at fixed vantage points more than 1 km from the sheep.

What the studies show —

— around mineral licks:

During the Killermun study, the only day that mineral licks were not used was one when helicopter flights ran throughout the day and prevented sheep from approaching the licks.

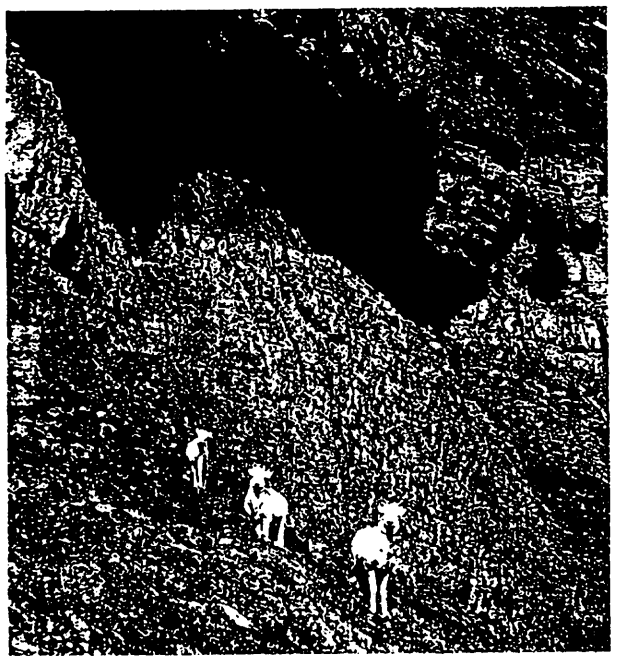
Mineral licks were used by the sheep primarily in the late morning or late afternoons. Generally, when helicopters approached, the sheep were disturbed enough to leave the licks.

Sheep fleeing an approaching helicopter.

— habituation:

The Dall sheep had stronger immediate responses to the first helicopter flight of the day (based on response time, first reaction distance and escape distance).

What is significant, however, is that even though the sheep did not generally flee at the sound of every exposure to helicopter intrusion, they did increase their vigilance — and vigilance is itself a disturbance to feeding and ruminating. The more frequent the disturbance, the more sensitive vigilance has to be to keep up with the increased frequency of potential threats.



Ridges provide natural visual and sound barriers.

— fleeing:

Sheep groups fled during overflights in 43 of 56 observations (77 per cent). In the remaining 13 observations (23 per cent), sheep either did not show an overt response or they became only vigilant. Animals ran and walked in 37 of the 43 fleeing events (86 per cent). They walked only in response to the other six overflights. In general, Dall sheep first stared at the helicopter and then alternated movement with vigilance bouts.

Sheep could be seen to flee as far as 1.5 kilometers. The Dall sheep tended to run towards rocky slopes and the distance fled increased as the distance to the rocky slopes became greater. Curiously, sheep that were not on rocky slopes before the overflights often kept fleeing after reaching these slopes.

— helicopter's angle of approach:

Dall sheep are more disturbed by direct approaches — both by helicopters and by people walking. Sheep tend to escape in an upward direction. Approaches on an angle

from below will disturb them less and not interfere with their escape route.

— visual and sound barriers:

Ridges provide natural visual and sound barriers.

— bedding and feeding:

Almost all of the Dall sheep that were bedded or feeding before the helicopter disturbance interrupted these activities to be vigilant or to flee. Most sheep that were bedded before the disturbance did not rebed. They switched to feeding after the overflights. This changed behaviour continued for at least six to 10 minutes after the helicopter left the area.

— vigilance, walking and running:

Sheep generally ran only when the helicopter was in the area. Running was rarely recorded during the pre and post overflight stages.

Sheep in a typical vigilance stance.

Aircraft disturbance: a growing concern —

Aircraft disturbance of Dall Sheep and other wildlife is a growing concern in the Yukon for two reasons:

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Find out more —

For more information or to ask for copies of the study papers, contact:

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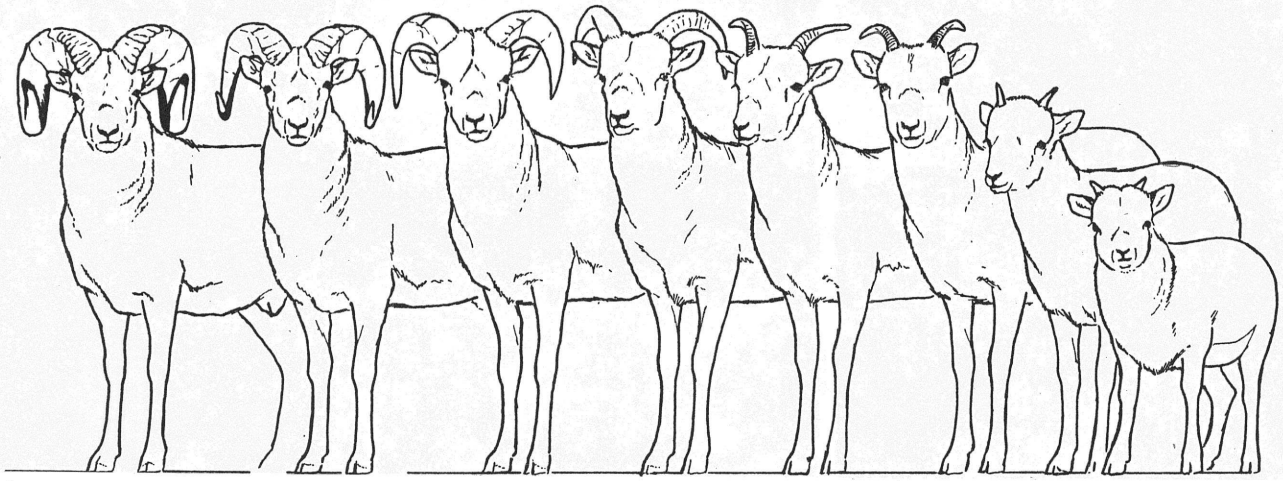
ski (1962b) gives an excellent description of newborn snow sheep from the Koryak highlands. These lambs appear to be similar in color to newborn Stone's lambs, being ash gray on the sides, dark gray on the neck, chest, and anterior parts of the front legs, and having a black tail and dark middorsal line. The belly, groins, rump, and dorsal margins of front legs and hind legs are white. Lambs shed the woolly juvenile coat between August and October and replace it with a coat similar to that of adults. At 6 months of age the Stone's and Dall's thinhorns and the Rocky Mountain bighorns that I studied had rather short horns compared to equal-age desert bighorn lambs as described by Hansen (1965). The lambs grow little between 6 and 12 months of age as is well illustrated by the data of Blood et al. (1970). In this, Rocky



-during the summer, rams are often in small groups, or alone, "nursery" bands tend to be larger
-this time of year, rams + nursery sheep are not found together (so if there are any lambs, there shouldn't be any rams in the group)

-from a distance, esp. at this time of year, these are indistinguishable

Yearling female
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Anna, the "curly horns" are the trick!

Have a good field trip

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Yearling rams
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