



Helicopter Sound and Mountain Goats

July 5, 2026

Summary

Mountain goats are sensitive to both the sight and sound of helicopters. We documented sound levels of a helicopter at various distances and attitudes to help quantify the disturbance of mountain goats by helicopter sound. The field methods we developed can be used to measure sound levels of any helicopter type. Sound levels of other helicopter types can also be compared to our results for the Bell 206 Jet Ranger.

Our hypotheses

Our first hypothesis is that a helicopter at 250 meters distance is much quieter and less intrusive for mountain goats than the same helicopter at 50 to 100 meters.

Our second hypothesis is that the sound level of an approaching helicopter is greater if the nose of the aircraft is pointed directly at the sound meter than if the helicopter is making a pass at a 90 degree angle.

Our test procedure

Our research team consisted of a camera operator and a laser range-finder operator in addition to the helicopter pilot. We flew from the helicopter base and landed at a nearby knoll at 1500 meters elevation. The two operators set up a tripod and mounted a DJI Action 5 camera and sound recorder on a cross bar mounted on a tripod so that both the sound meter and camera were always pointed directly at the helicopter. The two ground-based operators kept in touch with the helicopter pilot using hand-held VHF radios tuned to LAD 2.

Wind was calm. Thermals were noted by the helicopter pilot. Weather was sun and cloud and temperature was 10 degrees Celsius. The helicopter made numerous passes at varying distances. We initially planned on recording all DB sound levels and distances to the helicopter using a pad and pencil. We soon learned that the DJI camera microphone can be used to record all data. The camera is switched on for the entire test. The camera operator keeps the helicopter centered in the camera lens and watches the DB meter until the DB value is at the highest value. The camera operator then calls out the

highest DB value and the range-finder operator calls out the distance. The DJI camera records the passing helicopter on video. At the same time, the camera microphone also records the spoken data consisting of the DB sound level and the distance.

All test flights were flown at 90 kilometer per hour. That airspeed is typical for aerial population surveys and well within the safety parameters for the Bell 206 Jet Ranger. Our sound meter was set to C weight Fast in order to pick up as many sound frequencies as possible. The sound meter was calibrated to 92 DB.

Test results

Our tests show that helicopter sound at 50 meters distance is in the range of 93 to 98 DB. The sound at 250 meters is closer to 76 DB. Each increase of 10 DB doubles the sound level. Going from 76 DB to 96 DB doubles the sound twice. Sound levels at 50 meters are in the range of four times the levels at 250 meters.

The visual impact of a helicopter at 250 meters is also less than viewing a helicopter at 50 meters. The helicopter at 250 meters appears to be going much slower than at 50 meters even if the actual airspeed is the same.



Figure 1 Graph showing DB and distance for all level passes with linear regression

The graph above shows significant variation in the DB sound levels at similar distances. There are a number of factors that include thermal activity, whether the helicopter is slightly descending or ascending, attitude of the aircraft and differences in sound levels between the port and starboard side of the aircraft that may contribute to the variations.

Discussion

Despite the variation of some of the data, the graph reinforces our hypothesis that sound levels for a helicopter at close range is very intrusive for mountain goats compared to flights at 250 meters.

Traditional helicopter survey flights for mountain goats are flown at 50 to 100 meters from the mountain side. Our new Smithers Method is flown at 200 to 250 meters from the mountain side. Our test results

show that sound levels of a Bell 206 Jet Ranger helicopter flown at 50 meters are approximately four times the sound levels at 250 meters. Our first hypothesis is valid.

As to our second hypothesis, sound levels when the helicopter nose was pointed directly at the camera did not increase compared to sound levels when the helicopter was flying at 90 degrees to the camera, and at the same distance. The sound changed slightly to a chopping sound but the DB sound level did not increase. Our second hypothesis was not validated.

We have observed that mountain goats learn quickly, especially if the event is both random and traumatic. We submit that the sudden appearance of a helicopter at 50 meters, 90 kilometer per hour and with 95 DB of sound is a traumatic event. One benefit of our Smithers Method is that survey flights do not need to be flown closer than 200 meters from mountain goats. We want to avoid “teaching” mountain goats that helicopters are threatening and that an alarm response is appropriate whenever a helicopter is heard even if a kilometer or more distant.

When the crew of a traditional survey flights wish to verify an observation, they fly one or more circling return passes that multiply the impact for mountain goats. Our Smithers Method is designed for “one-pass only” flying. The flight crew does not have to actually see mountain goats to photograph them.

Our test was conducted on one helicopter type, the Bell 206 Jet Ranger, but our test procedure could be applied to any helicopter type. This Jet Ranger is our current favourite type for flying aerial surveys. There may be better helicopters for mountain flying in severe weather and with heavy loads but aerial surveys for mountain goats are best conducted in March and April in good weather with a light load, an easy task for the Jet Ranger.

Thanks to our pilot, Brett Bastin of Up and Away Helicopters, Hazelton BC, for flying safe and skillful manoeuvres during our test flights.

Equipment list:

- DJI Action 5 camera
- Benetech GT 1355B sound meter
- AZ Sound Level Calibrator 8930
- E-Image tripod with GH06 video head
- Nikon ProStaff 100 laser range finder

Video is available at:

[Mountain Goats - YouTube](#)

A review of past Smithers Method flights is available here

[Our mountain goat publications](#)



Figure 2 Camera and sound meter on cross bar on tripod

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Figure 3 helicopter at 50 meters distance

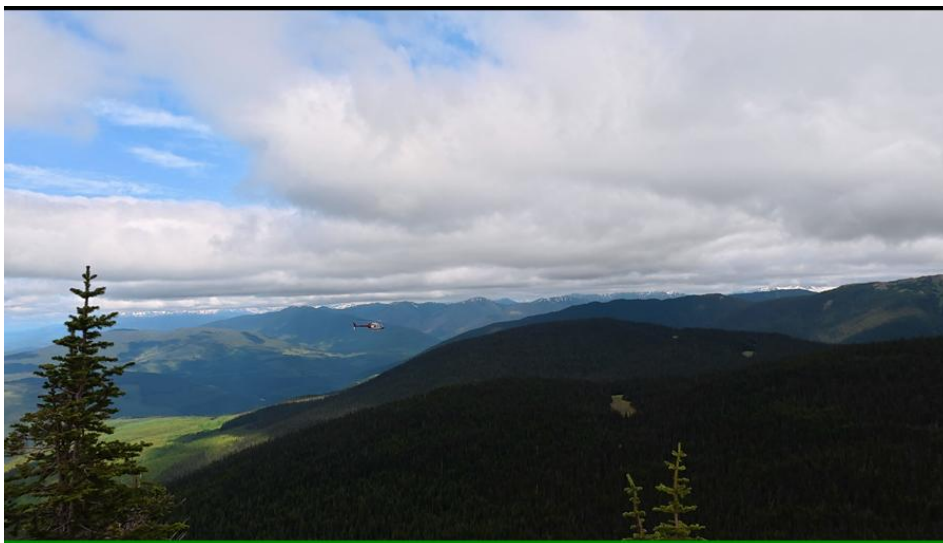


Figure 4 helicopter at 220 meters distance