



2026 Smithers Method Flight Tests

April 30, 2026

Summary

First extended flight tests of our Smithers Method are complete. All systems work as designed. Our Smithers Method makes aerial population surveys for mountain goats less invasive and gathers more data compared to traditional survey methods.

Aircraft

Early in the month of April, 2026, we had the opportunity to test our Smithers Method on extended survey flights for mountain goats (*Oreamnos Americanus*) for the first time. Two flights totaled 675 kilometers over 5.5 hours. Two types of helicopter were used – an Airbus A-Star and a Bell 206 Jet Ranger.

The Bell 206 had several advantages. It can be flown slower than the A-Star which made spotting mountain goats easier. The Bell 206 averaged 120 km/hour with a minimum in-flight speed of 60 km/hour. The large bubble windows made photography easy.

In contrast, the AirBus A-Star was faster and averaged 136 km/hour with a minimum in-flight speed of 77 km/hour. The increase in minimum speed reduces the time available to spot mountain goats. There were no bubble windows on the A-Star which made photography more difficult. The A-Star is a larger helicopter than the Bell 206 but with a crew of three - pilot, navigator and photographer, the space in the Bell 206 was more than adequate for the Smithers Method.

During the A-Star flight, we took 94 photos and kept 34. We photographed 27 mountain goats in the 1.5 hour flight over 204 kilometers. During the Bell 206 flight, we took 330 photos and kept 86 including photos of 30 mountain goats. That flight lasted 4 hours over a distance of 471 kilometers. The difference in the number of goats seen per hour of flight time can be attributed to a difference in available habitat on the two mountain ranges.

Camera

Overall, the camera worked perfectly with no need to change SD cards or batteries in-flight. A shutter speed of 1/640 second worked flawlessly. Only one photo out of the total of 424 photos was blurred.

The distance of 250 meters from the helicopter to the mountain side worked well. The Smithers Method camera can photograph an entire mountain slope from 1400 to 1700 meters elevation in one pass. The best time of year for a survey is March or April when mountain goats are still in winter habitat at that elevation band.

The camera with the 45 mm lens has a 62.6 degree angle of view and a horizontal field of view of 300 meters wide at 250 meters distance from the camera to the mountain slope. The vertical field of view at the camera's 4:3 sensor ratio is 225 meters height at the same 250 meter distance to the slope. The camera can detect mountain goats at a distance of much more than 250 meters but the resolution and detail necessary to determine gender and age may not be sufficient. It is not necessary for the photographer to see the mountain goats through the viewfinder. Instead, the navigator/spotter and pilot simply refer to a large landmark near the goats or call out when the helicopter is broadside to the goats.

All photos are reviewed post-flight at 100% size. Each photo is carefully examined from edge to edge to reveal mountain goats. We record all details on a Photo Log that stays with the photo files and can be updated at any time. The Photo Log can record gender and age, tracks, direction of travel, beds, feed craters, avalanches, snow depth, signs of wind, etc. Photos without merit are discarded.

Laser range finder

We often use our laser range-finder during the flight to inform our pilot of the exact distance to the slope. After some flight time, each pilot became familiar with what 250 meters looks like.

Age and gender

The photos of the mountain goats are high resolution and adequate to determine age and gender. We use Social Context Probability to determine the more complex identities. Refer to our Smithers Method paper for more details. [Smithers Method Presentation May 7 2024.pdf](#)

Audio

We record all conversation in the helicopter using a splitter that feeds all audio to an audio recorder. One benefit of the audio recording is if the flight crew sees a mountain goat that the photographer happened to miss, the goat is still recorded on the audio file. Conversation among the flight crew is also a source of information about terrain, weather, habitat and other species in the area. Flight crew is encouraged to discuss any unusual or noteworthy details during the flight.

Data recording

During a traditional survey flight, a scribe writes down observations and enters waypoints into a tablet or computer at each goat sighting. In contrast, no written records are necessary during a Smithers Method flight. There is no need for setting waypoints for photos in flight. All data is recorded automatically and reviewed post-flight. All eyes are to the outside to spot goats. The only exception is that the navigator has to glance at the route on the GPS screen from time to time to keep the pilot on course.

Second passes

Second passes are common with traditional aerial survey methods where the field of view at 50 to 100 meters distance from the slope is narrow, and the time to observe any goat is limited. A second pass is often required to verify the first pass during a traditional survey. Both passes are very invasive and can panic the goats.

In contrast, with the Smithers Method, we fly 250 meters from the slope. The mountain goats appear comfortable when we pass them the first time. Goats that were bedded down stayed bedded. Most other goats watch us pass without moving. But whenever the helicopter turns out and returns for a second pass, the goats are usually in full retreat.

As a helicopter turns back for a second pass, the pressure wave in front of the rotor is pointed straight at the goats with a loud thumping sound, enough to frighten any mountain goat. There is a possibility that stress during such a random and threatening event may result in a permanent learned aversion to the source of the disturbance. In this case, goats could learn to feel stress while observing any helicopter whether the aircraft is close or distant. We have to make sure that we don't teach mountain goats the wrong things.

As the flights progressed, we minimized the number of second passes with a goal of making every photo count so that invasive second passes would not be necessary. We are now convinced that second passes are not necessary with more experience. A better way is to take more photos on the first pass.

Unseen goats

When we spot a group of mountain goats ahead, we often take a second or third photo to the side of the area. When we review the photos post-flight, we have found goats that were not seen by the flight crew. This advantage alone makes the Smithers Method a game-changer.

Photo geo-tag

The photos we take are not geo-tagged in the camera. We use software to combine the GPX track of the flight with the photos to insert UTM coordinates into each photo's metadata file. The software then displays the location of each photo on a map of the flight path.

Action camera

We installed a DJI action camera on a suction mount inside the front windscreen with a view straight ahead to record the entire flight. We had trouble with the camera heating up in the sun and shutting off. Since our flights, we have resolved that problem. The video can be combined with the audio recorder file to make a movie of the entire flight.

Movie

The action camera in the nose of the helicopter worked properly for a short period of time, enough to make a short movie clip available at [Smithers Method Flight Test](#). The conversation among the flight crew can be heard. Titles are inserted at exact times during the movie to signal where high-resolution photos were taken. The viewer can stop the movie and view the photo image that matches the number on the screen.

In one sitting, the viewer has access to a complete movie of the flight with audio along with high-resolution photos. The movie, GPS track, map and Photo Log can be an historical record of the flight available to any expert world-wide.

For further information, see our original Smithers Method paper at [Smithers Method Presentation May 7 2024.pdf](#)

We are restricted by confidentiality on disclosing some details about our test flights but we thank all the crew that helped make the flights possible. You know who you are.

Smithers Method equipment:

Fujifilm GFX 100s camera, 45mm GF lens, Garmin 276cx handheld GPS, Nikon Prostaff 1000 laser range finder, Sony PX 470 audio recorder, DJI Action 5 camera, GoPro suction mount, Anker Powercore 26800 battery bank, aircraft audio splitter, cables.

We can make the Smithers Method equipment available on loan at no cost to BC Fish and Wildlife or other government staff for use or evaluation. Email mtgoats@bcnorth.ca to arrange.

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