

Moutonnée wig

Location and directions:

Old Fort Point sits in the middle of the Athabasca Valley. The view shown here is from Highway 16 as it bypasses the town of Jasper. To get to the viewpoint, just stay on the highway instead of turning off to enter the town. Watch for a paved pull-off on the eastbound side of the road, overlooking the Athabasca River. GPS coordinates: N52° 52.608', W118° 04.350'. Elevation: 1062 m above sea level.

Making a roche moutonnée

Pronounced "rosh moo-tun-EH," the term comes from **Horace-Bénédict de Saussure**, an early French scientist and mountaineer who was also the first to clearly define the term "geology." In 1786 he wrote of hills and rock outcrops in the Alps that reminded him of the "moutonnée" ("mutton") wigs worn by the French aristocracy. These wigs were oiled with mutton fat to shape them and hold the white powdered starch that was sprinkled onto them. Smooth and rounded on the back, combed upward in the front, such a wig looked rather like a sheep lying down.

Which is pretty much the shape of any bedrock hill carved by moving glacial ice. Old Fort Point is a classic *roche moutonnée*. It is rounded on the right (southwest) side and cliffy on the left (northeast) side.

During the **Late Wisconsinan** glaciation, at its height about 23,000 years ago, the Rockies were practically buried in glaciers. Only the higher peaks stuck up above the ice surface. Imagine all that weight pressing down on the landscape. Now imagine the ice creeping down the Athabasca Valley at the rate of perhaps ten metres per year. Boulders, pebbles and sand imbedded in the base of the glacier ground away at the rock beneath.

In some places, and these places were often where two valleys joined, the ice carved a hill from the rock. We don't know why any rock would be left at such a place, where one would think that the combined flow of the two ice streams would be very powerful and extra-erosive. But something prevented the ice from grinding the valley floor completely flat. Here is a mystery waiting to be solved!

The side of the hill facing into the flow of the ice was left smooth and rounded, like the back of a sheep, while the side facing away from the flow, downstream, was turned into a cliff. The ice would have arched over this cliff, which grew higher and steeper as meltwater seeping into cracks would freeze, expand, and pry pieces of rock loose. The pieces would wind up in the ice flowing away from the cliff and be carried off.

By 14,000 years ago the Late Wisconsinan glaciation had ended. The ice had melted away. Old Fort Point remained as a *roche moutonnée*, the shape testifying to its glacial origin.

A sheep-back hill complete with sheep

Old Fort Point is ideal habitat for bighorn sheep. The gentler slopes face toward the southwest, where they receive lots of sunlight, making them warm and dry. The soil on these slopes is so thin that the bedrock shows through in places. Too thin and too dry to support many trees and shrubs, the soil is sufficient for growing a hardy grass species, aptly named **sheep fescue**.

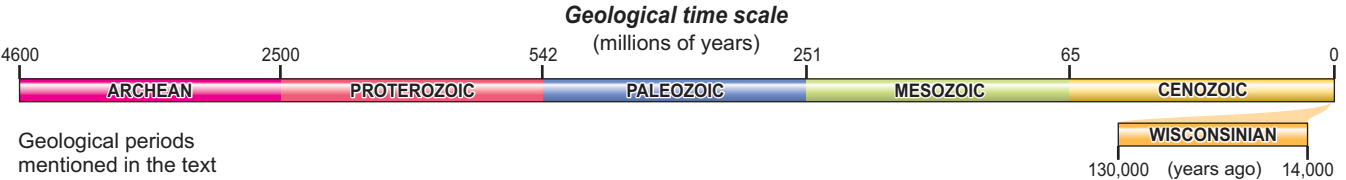
The photo is of a bighorn ram (male). Through binoculars, you may see small groups of rams on the hill. They alternately graze, lie down to chew their cuds (they re-grind partially digested food brought up from the stomach) and casually butt one another to show who is dominant over whom. If ewes (females) are present, you can identify them by their thinner, shorter horns.

When wolves come around to attack the sheep, escape is close by. The sheep run over to the top of the cliffs along the north side of the hill—the side we see from this viewpoint—and climb down onto ledges. Wolves are afraid of heights and seldom pursue them there.

These sheep are used to people and surprisingly tolerant. If you hike the trail up Old Fort Point, you may get wonderful photos of them. The animals are no danger to us, but do give them enough room to carry on their activities. If a sheep moves away from you, back off. You are too close. Remember, the national park exists to protect wildlife. As good environmental stewards, we should not be harassing animals in a national park, even unintentionally.



Bighorn ram  
Photo by Larry Lane



### Overflow for ice, highway for humans

The Late Wisconsinan glaciers that gave us Old Fort Point also gave us something else: an easy route across the Rockies.

The ice was even thicker to the west than it was here. Overtopping the Rocky Mountain Trench, a large glacier flowed eastward right over what is now Yellowhead Pass from British Columbia into Alberta. We know this because a trail of glacier-carried boulders—erratics—leads from the west side of the pass through the Jasper area and on east to the town of Edson, 165 km away along Highway 16.

Humans have travelled that same route for many thousands of years. Yellowhead Pass might have linked two steep and treacherous river-cut canyons before glaciation, but the erosive ice deepened and widened the gap considerably. First Nations people found that they could cross it whenever they wanted to hunt, fish or trade across the mountains.

In the early and mid-1800s, fur traders used the pass occasionally en route to and from what is now Prince George. In 1872 the Canadian Pacific Railway was originally surveyed through Yellowhead Pass, but the company decided to cross the Rockies farther south, at Kicking Horse Pass west of Lake Louise. In 1911 a different railway was built over Yellowhead Pass, followed by a second line two years later and a rough road in the 1940s. The modern Yellowhead Highway opened in 1970.

And who was “Yellowhead”? He was a fair-haired Iroquois fur-trade figure who lived at Tête Jaune Cache, the western gateway to the pass, in the 1820s.

### Want to know more?

Consult these publications and websites:

- Gadd, Ben (2008) *Canadian Rockies Geology Road Tours*, pages 126 (more about roches moutonnées) and 426–429 (more about the mountains seen from Old Fort Point).
- — (2009) *Handbook of the Canadian Rockies*, pages 384 (sheep fescue grass) and 654–656 (bighorn sheep).
- — (2011) *Old Fort Point Up Close GeoVistas Brochure*, Canadian Federation of Earth Science.

All GeoVistas brochures, including this one, are available for free download from:

[www.earthsciencescanada.com/geovistas](http://www.earthsciencescanada.com/geovistas)

### Please refer to this publication as:

Gadd, B. (2011) *Old Fort Point Distant View GeoVistas Brochure*, published by the Canadian Federation of Earth Sciences.

Copyright 2011 by Canadian Federation of Earth Sciences.  
All rights reserved  
Except as noted, all photos are by the author.

Également offert en français



Published in celebration of the International Year of Planet Earth, [www.earthsciencescanada.com](http://www.earthsciencescanada.com).

Special thanks to the Geological Survey of Canada, Canadian Geological Foundation, Parks Canada and the Friends of Jasper National Park for their support.



## Jasper National Park Old Fort Point Distant View

### The sheep-back hill

Old Fort Point is a hill found where logic tells us there shouldn't be one. If that were not odd enough, this hill is a classic example of a glacial feature named for a type of wig.

*GeoVistas*  
Earth Science vignettes