

Glaciers and Icefields

Abstract

Glaciers and icefields are huge masses of ice, formed on land by the compaction and re-crystallization of snow, that move very slowly down slopes, or move outward due to their own weight. In Canada, an estimated area of 200 000 square kilometres, or about 2% of the country's area is covered by glaciers and icefields. A huge quantity of freshwater is frozen in the polar ice caps and in high mountain glaciers. Glaciers and icefields are found in Western Cordillera and the mountains in the eastern Arctic. At present there are no reliable figures on the total number of glaciers in Canada. Glaciers exert a direct influence on the hydrologic cycle by slowing the passage of water through the cycle. Like groundwater, glaciers are excellent natural storehouses of water.

This map shows the distribution of glaciers and icefields in Canada, and also gives the names of some of their more important individual bodies. The text below discusses the distribution of these features, and then briefly comments on their impact on the environment and on the population.

Glaciers and icefields are huge masses of ice. Generally, glaciers flow in one direction, usually down a valley, while icefields and their larger equivalents, icecaps, flow outward in many directions. Glaciers and icefields cover about 10% of the earth's land area, mainly in Antarctica and Kalaallit Nunaat (Greenland). In Canada, an estimated area of 200 000 square kilometres, or about 2% of the country's area is covered by glaciers and icefields.

A huge quantity of freshwater is frozen in polar ice caps and in high mountain glaciers. Snow that is packed down over many years at high elevations becomes glacial ice, which slowly proceeds downslope like a frozen river, under the pull of gravity, and eventually melts to become part of streamflow at lower elevations. If the rate of melting is greater than the rate of accumulation, the glacier recedes; if it is less, the glacier advances.

Distribution of Glaciers and Icefields

Although glaciers and icefields are only found in two regions of Canada - the Western Cordillera and the mountains found in the eastern Arctic - and they are very numerous and widely-distributed within these areas. All ice features are remnants of the icefields of the last ice age, which peaked about 18 000 years ago.

In western Canada, glaciers occur at much higher elevations in the Rocky Mountains than in the wetter Coast Mountains. Mountain glaciers carve out a variety of

distinctive features such as bowl-shaped features called cirques on the sides of mountains. The Arctic islands contain many glaciers and also have many large icecaps. Ellesmere, Baffin, Devon and Axel Heiberg islands contain huge icecaps which range up to one kilometre thick.

Table 1 summarizes the extent of icefields and glaciers. At present there are no reliable figures on either the total number of glaciers in Canada. The National Hydrology Research Institute of Environment Canada is in the process of identifying and measuring all glaciers. Tables 1a and 1b show the best available estimates for areas by region, and the number of glaciers for those areas surveyed to date.

Table 1a. Number and Area of Glaciers in Canada

	Ice Area (km ²)	Number of Glaciers
Arctic islands		
Axel Heiberg Island	11 380	1 121
Baffin Island	35 900	10 224
Bylot Island	4 850	575
Coburg Island	220	92
Devon Island	15 720	1 852
Ellesmere Island	77 600	Data not available
ice shelves adjoining Ellesmere Island	490	Data not available
Meighen Island	80	Data not available
Melville Island	150	Data not available
North Kent Island	150	66
Total for Arctic islands	146 540	Data not available
Total for Canada	195 035	Data not available

Source: Canada. Environment Canada. National Hydrology Research Institute. Ottawa, 1999.

Table 1b. Mainland Part of Canada: Glacier Data by Drainage Areas

Region	Ice Area (km ²)	Number of Glaciers
Nelson River	320	1 616
Yukon River	10 250	Data not available
Great Slave Lake	600	Data not available
Pacific Ocean (other than Yukon River drainage)	36 530	Data not available
Arctic Ocean (other than Great Slave Lake drainage)	810	Data not available
Atlantic Ocean	25	Data not available
Total for Canadian mainland	48 535	Data not available
Total for Canada	195 035	Data not available

Source: Canada. Environment Canada. National Hydrology Research Institute. Ottawa, 1999.

Importance of Glaciers and Icefields

Glaciers exert a direct influence on the hydrologic cycle by slowing the passage of water through the cycle. Like groundwater, glaciers are excellent natural storehouses of water. One form of release by glaciers is in sudden outburst floods called "jökullhaups". Usually, the release is more gradual with glaciers having their highest rate of melting in the summer. Glacier-fed rivers, which include many of the largest rivers in Alberta and British Columbia, reach their peak flow during hot summer weather when other sources of water in these regions may be scarce. They are, therefore, extremely important to the relatively dry Prairie region as sources of water for irrigation, electric power, and uses by communities located close to these rivers.

Map Sources

Glaciers

GeoInsight Corporation. 1999. Selected Named Icefields and Glaciers.

Icefields

GeoInsight Corporation. 1999. Selected Named Icefields and Glaciers.

References

Canada. Environment Canada. 2000. A Primer on Fresh Water: Questions and Answers. Fifth Edition. Ottawa (<http://www.ec.gc.ca/eau-water/>).

Canada. Environment Canada. 2001. Tracking Key Environmental Issues. 2001. Ottawa (http://www.ec.gc.ca/TKEI/toc/toc_e.cfm).

Federal-Provincial Task Force on the Importance of Nature to Canadians. 1999. The Importance of Nature to Canadians: Survey Highlights. Ottawa: Environment Canada (<http://www.ec.gc.ca/nature/highlights/highlite.html>).

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Stanké, Alain (ed.). 2000. L'Encyclopédie Canada 2000. Montréal, Québec: Éditions internationales Alain Stanké.

Related Web sites (1999 – 2009)

Federal Government

Environment Canada. Freshwater Web Site

<http://www.ec.gc.ca/eau-water/>

This web site gives access to the nature of water, water policy and legislation, the management of water, water and culture, and informational resources and services.

Environment Canada. Quebec Region. The St. Lawrence Centre

<http://www.qc.ec.gc.ca/csl/index.html>

The St. Lawrence Centre studies the ecosystems of the St. Lawrence River and conduct research programs with the aim of better understanding how these ecosystems function, and maintaining knowledge of the St. Lawrence River up to date.

Environment Canada. The National Water Research Institute

<http://www.ec.gc.ca/inre-nwri/>

The National Water Research Institute (NWRI) is Canada's largest freshwater research establishment. NWRI conducts a comprehensive program of research and development in the aquatic sciences, in partnership with the Canadian and international science communities.

Fisheries and Oceans Canada. Canadian Hydrographic Service (CHS)

<http://www.charts.gc.ca/>

The CHS is responsible for charting Canada's 243,792 kilometres of coastline (the longest of any country in the world) and 6.55 million square kilometres of continental shelf and territorial waters (the second largest in the world) and an extensive system of inland waterways.

Natural Resources Canada. Centre for Topographic Information. Geographical Names of Canada

<http://geonames.nrcan.gc.ca/>

The Canadian Geographical Names Data Base (CGNDB) contains some 500 000 records, over two-thirds of which are currently official names, as approved by the Canadian Permanent Committee on Geographical Names (CPCGN). It is the fundamental national data base to provide official names of mapping and charting, gazetteer production, and World Wide Web reference, and other geo-referenced digital systems.

Other

University of Guelph. Canada's Aquatic Environments

<http://www.aquatic.uoguelph.ca/index.htm>

This site, at the University of Guelph, gives information on lakes, rivers, wetland regions and aquatic animals and plants.

Inter-agency

International Joint Commission

<http://www.ijc.org/>

The International Joint Commission is an independent binational organization established by the Boundary Waters Treaty of 1909. Its purpose is to help prevent and resolve disputes relating to the use and quality of boundary waters and to advise Canada and the United States on related questions.

