

Boreal Catchments Version 1.8

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Shapefile Name: boreal_catchments_v18.shp

The catchment dataset was developed to serve as building blocks for the design of ecological benchmarks in the boreal region of Canada. The dataset is used with the Benchmark Builder, a software application developed in Microsoft C# for the .Net framework. For more information on the Benchmark Builder, visit www.beaconsproject.ca/builder.

DESCRIPTION OF THE CATCHMENT DATASET

A catchment is an area of land that drains surface water and precipitation to a common low point or outlet such as a river or lake. This dataset represents approximate drainage areas for individual stream segments. The catchment dataset is available as a polygon shapefile and was created in ESRI ArcGIS 10 using the BEACONS GIS Tools and ESRI Arc Hydro Tools. The primary datasets used to create the catchments are Atlas of Canada 1:1,000,000 Drainage Network Skeleton Version 6 (NRCAN 2009a) and the Canada 3D Digital Elevation Model (1:250,000) (NRCAN 2009b) (Figure 1). The Drainage Network Skeleton is comprised of arcs representing rivers and flow lines through lakes and includes stream-ordering attributes that are queried by the Benchmark Builder to determine the relative upstream and downstream position of each arc (NRCAN 2009c). Each catchment contains a stream arc into which the surface water of the catchment drains. Catchments in the boreal range in size from 1 km² to 1,987 km² (mean 30 km², median 13.5 km²). For more details on how the catchment dataset was created, visit www.beaconsproject.ca/catch.

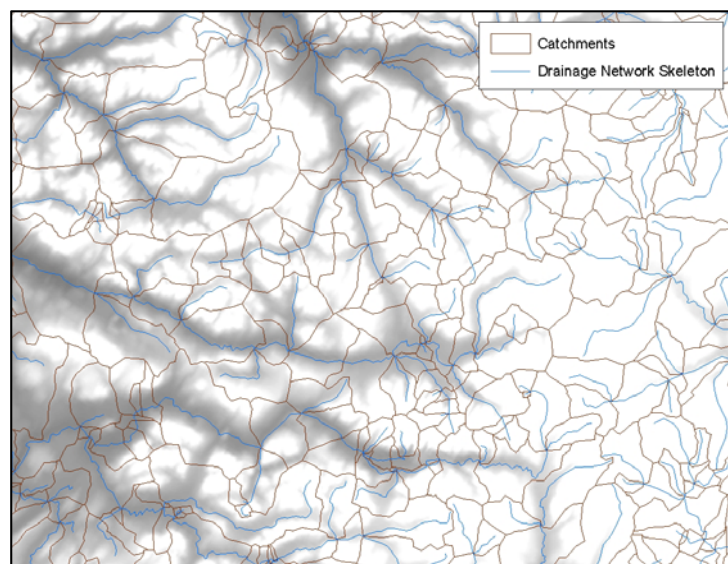


Figure 1: Catchments and the Drainage Network Skeleton superimposed on the Canada3D digital elevation model

SPATIAL EXTENT OF THE BOREAL CATCHMENT DATASET

Boreal Catchments Version 1.8 is restricted to the area shown in green in Figure 2 and is comprised of all catchments with stream segments intersecting the boreal region as defined by Brandt's (2009) boreal and boreal alpine with the exception of Ile d'Anticosti and Gaspésie regions (N=184,579). All oceanic islands with the exception of Newfoundland are excluded from the dataset. For information on how to create catchments, see www.beaconsproject.ca/catch.



Figure 2. The spatial extent of the boreal catchment dataset is shown in green.

CATCHMENT ATTRIBUTES

The boreal catchment dataset (boreal_catchments_v18.shp) has 17 attributes. The catchment attributes are listed and briefly described in Table 1. Some of the attributes are further elaborated upon in the text that follows.

Table 1. Description of catchment attributes. Many of the catchment attributes were created for use with the Benchmark Builder and are indicated with an “X.”

Attribute	Description	Builder
Area	Total area of the catchment in m ² .	
Perimeter	Perimeter of the catchment in m.	
SKELUID	Unique identifier for stream arcs from which the catchments were created.	X
CATCHNUM	The unique identifier of the catchment.	X
ODRAINAGE	The ocean drainage within which the catchment resides.	
LAKEUID	A value greater than zero indicates that the stream arc of the catchment is associated with a lake, wetland, or double-line river.	
BASIN	One of four variables used to describe stream flow direction.	X
STRAHLER	Strahler stream order of the catchment. The value ranges from 1-19.	
ORDER1	One of four variables used to describe stream flow direction.	X
ORDER2	One of four variables used to describe stream flow direction.	X
ORDER3	One of four variables used to describe stream flow direction.	X
Area_land	Terrestrial area of the catchment in m ² . (Area_land = Area_total – Area_water)	X
Area_water	Lake area of the catchment in m ² .	X
Area_total	Total area of the catchment in m ² .	
IFL_2010	Proportion of catchment area that is intact (values of 0 to 1) based on GFWC Intact Forest Landscapes (Lee et al. 2010)	X
length_m	The length in metres of drainage network within the catchment.	X
WSCSSDA	The sub sub drainage area to which the catchment belongs.	X

Hydrology Attributes

ODRAINAGE¹ – This is the ocean drainage area within which the stream arc of the catchment resides. The stream arcs of the boreal catchments are nested within four ocean drainages of Canada: Pacific, Arctic, Hudson Bay, and Atlantic.

Area_water¹– The area of water in a catchment is based on the Atlas of Canada 1,000,000 Drainage Network Lake polygon coverage (Figure 3). The lake polygon coverage is comprised of lakes, double-line rivers, and wetlands.

¹ For more information about the Atlas of Canada and Water Survey of Canada datasets, see NRCAN. 2009. Atlas of Canada 1,000,000 National Frameworks Data, Hydrology Version 6.0 - A practical guide to the datasets. http://geogratis.gc.ca/download/frameworkdata/hydrology/analytical/drainage_network/1M_HYDRO_GUIDE_EN_2009.pdf

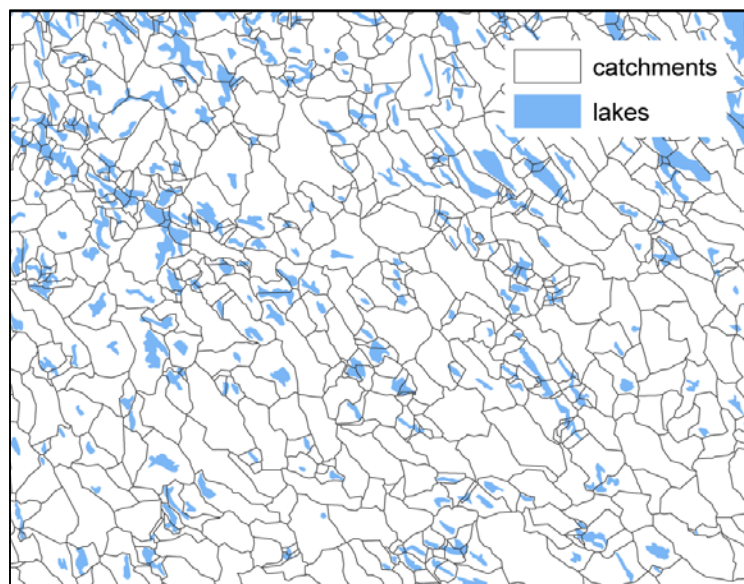


Figure 3. Catchments with the Atlas of Canada 1,000,000 Drainage Network Lake Version 6 polygon coverage.

WSCSSDA² – This attribute is the Water Survey of Canada Subsub Drainage Areas (SSDAs). Catchments were assigned to SSDAs based on the location of the catchment's stream arc. Stream arcs are nested within SSDAs. The SSDAs are nested within the Ocean Drainages.

The following attributes were transferred from the Atlas of Canada 1,000,000 Drainage Network, Version 6 to the catchment dataset. These attributes belong to the stream arc of the catchment:

SKELUID¹ – This attribute is equivalent to the UID_v6 attribute in the Drainage Network. It is the unique identifier of the stream arc.

LAKEUID¹ - This attribute identifies whether the stream arc of a catchment is associated with a lake, double-line river, or wetland. If LAKEUID = 0, the catchment is not associated with a water body at the 1,000,000 scale.

STRAHLER¹ – This is the Strahler stream order number. Across the extent of the dataset, STRAHLER ranges from 1 to 19. The stream order system classifies stream segments based on the number of tributaries upstream. Order 1 and Order 2 stream segments are often referred to as headwaters.

BASIN, ORDER1, ORDER2, ORDER 3¹ – Together, these 4 attributes describe the direction of stream flow.

² For more information about the Atlas of Canada and Water Survey of Canada datasets, see NRCAN. 2009. Atlas of Canada 1,000,000 National Frameworks Data, Hydrology Version 6.0 - A practical guide to the datasets. http://geogratis.gc.ca/download/frameworkdata/hydrology/analytical/drainage_network/1M_HYDRO_GUIDE_EN_2009.pdf

Intactness

IFL_2010 – This is the proportion of area in the catchment that is intact and is derived from Global Forest Watch Canada’s Intact Forest Landscapes (IFL) (Figure 4). Values range from 0 to 1 (i.e., 0% to 100% intact). It is important to note that the IFL coverage does not cover the full extent of the catchments dataset (Figure 4). An IFL_2010 value of 9 indicates that the catchment lies beyond the IFL coverage and the proportion of area intact cannot be calculated for the catchment. While the catchment dataset includes IFL_2010, the intactness of a catchment does not have to be based on GFWC’s IFL dataset. If it exists, an alternative intactness dataset could be used.

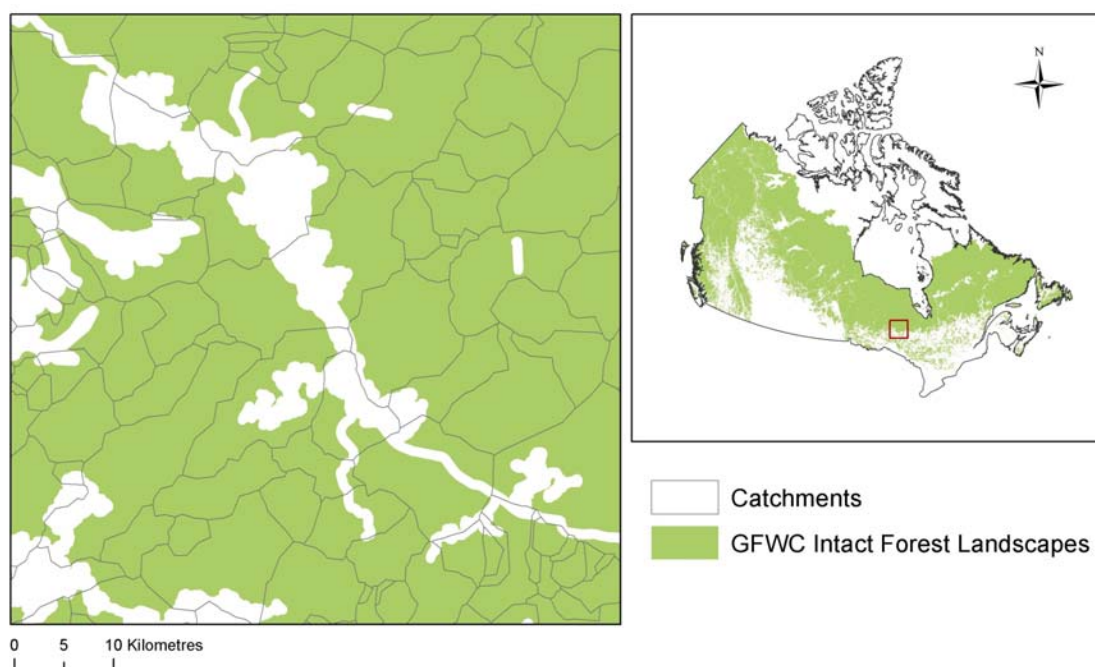


Figure 4. IFL_2010 is the proportion of area in the catchment that is intact. The intact area within a catchment is based on Global Forest Watch Canada’s Intact Forest Landscapes (Lee et al. 2010). The Intact Forest Landscapes map identifies all remaining intact forests that are greater than 5,000 ha in the boreal region and greater than 1,000 ha in the adjacent temperate region. Intact areas represent areas without detectable human influence based on the interpretation of Landsat imagery and existing datasets for roads, reservoirs, railways and transmission lines. Depending on the type of disturbance, a buffer of 500 - 1000 m was applied to the disturbance. For more information on Global Forest Watch Canada’s Intact Forest Landscapes, visit http://www.globalforestwatch.ca/Anniversary2010/01CanadaAtlasIFL/01CanadaAtlas_IFL_lowres.pdf.

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