Natural Resources Canada | Ressources naturelles Canada

Historical flood events (HFE)

2021-12-09

Natural Resources Canada
Strategic Policy and Innovation
Canada Centre for Mapping and Earth Observation
Emergency Geomatics Services

Client Services
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Canada

Copyright notice

RELEASE HISTORY

Date	Description
2021-12-09	Original version
2022-07-20	Update

TABLE OF CONTENTS

1 OVERVIEW

1.1 TITLE

Historical flood events – Product Specifications

1.2 REFERENCE DATE

Data product specifications creation date:

2021-12-09

1.3 RESPONSIBLE PARTY

Natural Resources Canada
Strategic Policy and Innovation Sector
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Client Services

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1.4 LANGUAGE

eng – English

fra - French

1.5 ABBREVIATIONS AND ACRONYMS

ESRI	Environmental Systems Research Institute, Inc.
FGDB	ESRI File GeoDatabase
FTP	File Transfer Protocol
GIS	Geographic Information System
ISO	International Organization for Standardization
NAD83	North American Datum of 1983
CSRS	Canadian Spatial Reference System
NRCan	Natural Resources Canada
OGP	International Association of Oil and Gas Producers
SPI	Strategic Policy and Innovation Sector
WMS	Web Map Service

1.6 INFORMAL DESCRIPTION OF THE DATA PRODUCT

The Historical flood events (HFE) dataset contains geospatial information from various government and media sources standardized in a common data model. Floods are represented by points positioned within the boundaries of the municipalities that were affected. It is to be noted that the points do not indicate the precise location where the flood occurred. The points are grouped according to the event that caused the flooding over time. Floods that affected more than one location are represented by multi-points.

The Historical flood events (HFE) dataset originates from the openly available data sources from provincial, territorial and federal governments. A link to the source(s) used is associated with each point for more information. The dataset is assembled by Natural Resources Canada and is freely available under the open government license of Canada.

No consultation was conducted with the various providers and stakeholders of historical flood data. Disparities in content between the various sources result in an inconsistent product. No warranty is given as to the accuracy or completeness of the information provided. The absence of information does not mean that no flooding has occurred.

2 SPECIFICATION SCOPE

2.1 SCOPE IDENTIFICATION

Main

2.2 LEVEL

Dataset

2.3 LEVEL NAME

Historical flood events

2.4 EXTENT

This section describes the spatial and temporal extent of the scope.

2.4.1 Description

Canadian territory

2.4.2 Vertical extent

The data is two-dimensional. There is no elevation (z) associated with the data.

2.4.2.1 Minimum value

Not applicable

2.4.2.2 Maximum value

Not applicable

2.4.2.3 Unit of measure

Not applicable

2.4.2.4 Vertical datum

Not applicable

2.4.3 Horizontal extent

2.4.3.1 West bounding longitude

-141.0

2.4.3.2 East bounding longitude

-52.6

2.4.3.3 South bounding latitude

+41.7

2.4.3.4 North bounding latitude

+83.1

2.4.4 Temporal extent

2.4.4.1 Beginning date

1696

2.4.4.2 Ending date

2021-06-08

2.5 COVERAGE

Full extent

3 DATA PRODUCT IDENTIFICATION

3.1 TITLE

Historical flood events

3.2 ABSTRACT

The Historical flood events dataset contains point features. The following attributes are included as a minimum requirement, but additional attributes are included when provided by the source.

Flood cause: The main cause of flooding.

Start date: Date of the beginning of the flood (e.g. 1954-10-15).

Season: Season in which the flooding began.

Locality: Name of the place affected by the flood.

Province or Territory: Province or Territory where the flood occurred. A flood event can occur in more than one province and/or territory.

Link: Hyperlink to the data source. Up to two hyperlinks can be provided when the attributive information of a flood is assembled from multiple sources.

Sources: Sources used for the attributive information and the point geometry.

3.2.1 Product and Methodology Description

The dataset is produced by combining various provincial, territorial and federal government geospatial data sources into a common data model. The point locations of the sources have been largely revised to have one location per place reported to have been affected by the flooding. Flooding events for which no location was included in the sources are positioned on the name of the place (toponym) affected by the flooding.

3.3 OBJECTIVE

The purpose of this dataset is to provide a geo-referenced and characterized image of past flooding in Canada. The dataset can be used to perform and illustrate geospatial and tabular analyses over time and space.

3.4 TOPIC CATEGORY

Main topics for the product, as defined by the ISO 19115-1:2014 standard:

001- farming

004 - climatologyMeteorologyAtmosphere

006 - elevation

007- environment

008 - geoscientificInformation

012 - inlandWater

014 - oceans

017 - structure (man-made construction)

018 - transportation

019 - utilitiesCommunication

3.5 SPATIAL REPRESENTATION TYPE

Multipoint

3.6 SPATIAL RESOLUTION

The dataset has low spatial resolution in that the flood occurrences are generalized to a point in the locality affected by the flood, with no indication of the specific location and extent of the flooding.

3.7 GEOGRAPHIC DESCRIPTION

3.7.1 Authority

International Organization for Standardization (ISO)

3.7.1.1 Title

ISO 3166-1:2013 Codes for the representation of names of countries and their subdivisions – Part 1 Country codes

3.7.1.2 Date

Reference date of the ISO 3166-1:2013 standard: 2013-11-01

3.7.1.3 Date type

002 - Publication

3.7.2 Code

Code of the geographical region covered by the product according to the ISO 3166-1 standard:

CA - Canada

3.7.3 Code Type

Type of code of the delimitation polygon of the extent according to the ISO 19115 standard:

1 - Inclusion (polygon delineation is inclusive)

3.8 REFERENCE TO SPECIFICATION SCOPE

Main

4 DATA CONTENT AND STRUCTURE

4.1 DESCRIPTION

The Historical flood events dataset contains point features. The following attributes are included as a minimum requirement, but additional attributes are included when provided by the source.

Flood cause: The main cause of flooding.

Start date: Date of the beginning of the flood (e.g. 1954-10-15).

Season: Season when the flood began.

Locality: Name of the place affected by the flood.

Province or Territory: Province or Territory where the flood occurred. A flood event can occur in more than one province and/or territory.

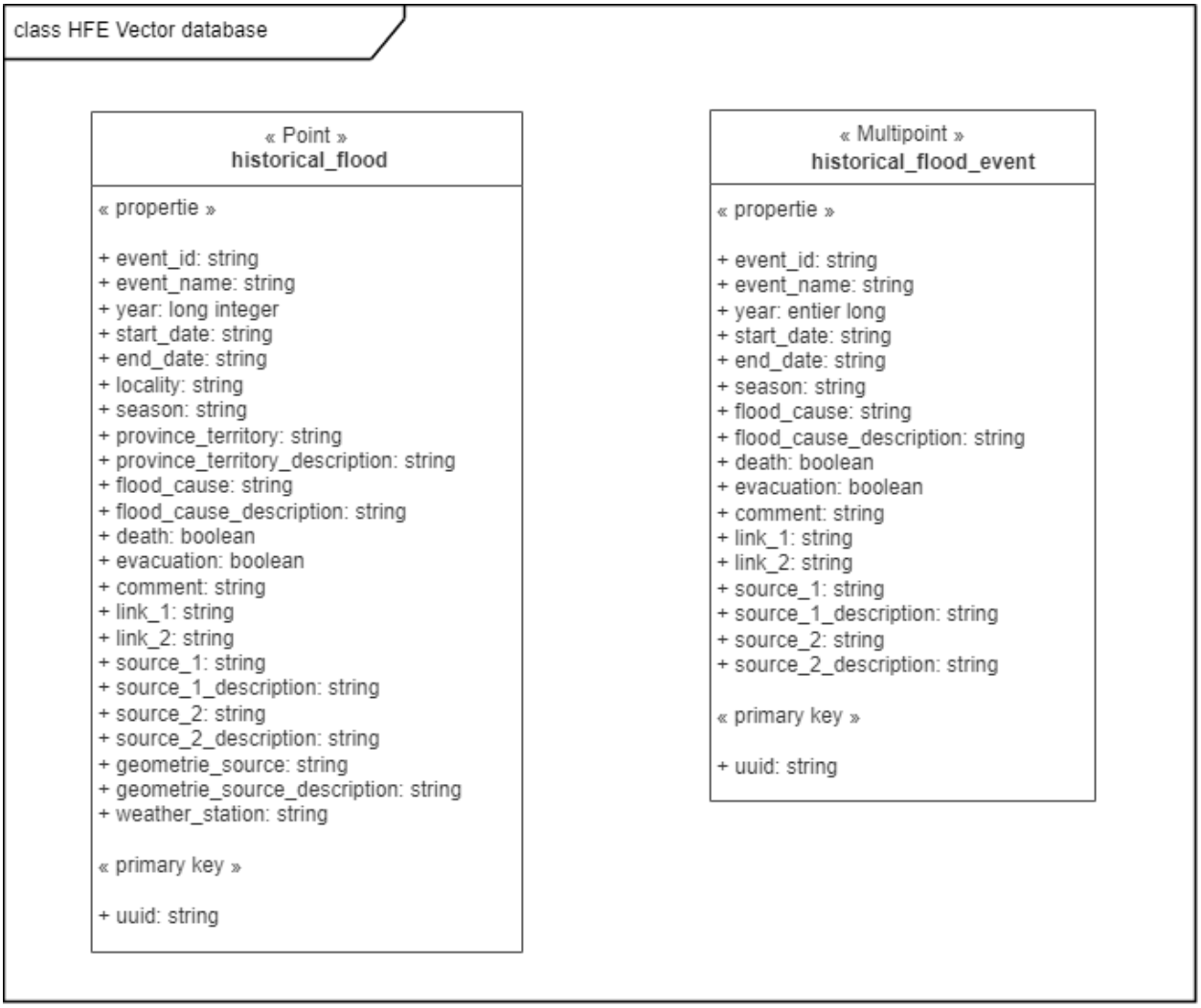
Link: Hyperlink to the data source. Up to two hyperlinks can be provided when the attributive information of a flood is assembled from multiple sources.

Sources: Sources used for the attributive information and the point geometry.

The Historical flood events dataset contains two features. There is the feature Historical Flood (historical_flood) that represent historic flood under point features. Then, there is the feature Historical flood events (historical_flood_event) where the points are grouped according to the event that caused the flooding over time. This feature represented under multipoint features.

4.2 DATA MODELLING SCHEMA

4.2.1 Application schema



4.2.2 Feature catalogue

Feature Name	Definition			
historical_flood <<Point>>	Historical flood in Canada.			
Attribute	**Definition**	**Type**	**Mandatory**	**Maximum Number of Values**
uuid	Unique identifier of the flood occurrence.	Uuid	Y	1
event_id	Identifier of the flood event. An event can have multiple locations.	String	Y	1
event_name	Name of the event associated to the historical flood in English, if known (e.g. Hurricane Hazel).	String	N	1
year	Year of the beginning of the historical flood (e.g. 2021).	Long integer	Y	1
start_date	Approximate date of the beginning of the historical flood (e.g. 1954-10-15).	String	Y	1
end_date	Approximate date of the end of the historical flood (e.g. 1954-10-15).	String	N	1
locality	Name of the locality affected by the flood.	String	Y	1
season	Season when the flooding started.	Season <<Code List>>	Y	1
province_territory	Province or Territory where the flood occurred.	Province or Territory <<Code List>>	Y	1
province_territory_description	Name of the Province or Territory where the flood occurred.	Province or Territory <<Code List>>	Y	1
flood_cause	The cause of flooding.	Flood Cause <<Code List>>	Y	n
flood_cause_description	Description of the cause of flooding.	Flood Cause <<Code List>>	Y	n
death	Indication (yes/no/unknown) as to whether the flood caused human fatalities.	Boolean <<Code List>>	Y	1
evacuation	Indication (yes/no/unknown) of whether people had to be evacuated during the flood.	Boolean <<Code List>>	Y	1
comment	Summary of the event reported by the data source.	String	N	1
link_1 link_2	Hyperlink to the source used for descriptive information.	String	N	2
source_1	Identifier of the primary source used for descriptive information.	Source <<Code List>>	Y	1
source_1_description	Description of the primary source used for descriptive information.	Source <<Code List>>	Y	1

source_2	Identifier of the secondary source used for descriptive information.	Source <<Code List>>	N	1
source_2_description	Description of the secondary source used for descriptive information.	Source <<Code List>>	N	1
geometry_source	Identifier of the source used to locate the event.	Geometry Source <<Code List>>	Y	1
geometry_source_description	Description of the source used to locate the event.	Geometry Source <<Code List>>	Y	1
weather_station	Hyperlink to the nearest weather station within 200 km.	String	N	1

Feature Name	Definition
historical_flood_event <<MultiPoint>>	Historical flood events in Canada.

Attribute	Definition	Type	Mandatory	Maximum Number of Values
uuid	Unique identifier of the flood occurrence.	Uuid	Y	1
event_id	Identifier of the flood event. An event can have multiple locations.	String	Y	1
event_name	Name of the event associated to the historical flood in English, if known (e.g. Hurricane Hazel).	String	N	1
year	Year of the beginning of the historical flood (e.g. 2021).	Long integer	Y	1
start_date	Approximate date of the beginning of the historical flood (e.g. 1954-10-15).	String	Y	1
end_date	Approximate date of the end of the historical flood (e.g. 1954-10-15).	String	N	1
season	Season when the flooding started.	Season <<Code List>>	Y	1
flood_cause	The cause of flooding.	Flood Cause <<Code List>>	Y	n
flood_cause_description	Description of the cause of flooding.	Flood Cause <<Code List>>	Y	n
death	Indication (yes/no/unknown) as to whether the flood caused human fatalities.	Boolean <<Code List>>	Y	1
evacuation	Indication (yes/no/unknown) of whether people had to be evacuated during the flood.	Boolean <<Code List>>	Y	1
comment	Summary of the event reported by the data source.	String	N	1
link_1 link_2	Hyperlink to the source used for descriptive information.	String	Y	2
source_1	Identifier of the primary source used for descriptive information.	String	Y	1

source_1_description	Description of the primary source used for descriptive information.	String	Y	1
source_2	Identifier of the secondary source used for descriptive information.	String	N	1
source_2_description	Description of the secondary source used for descriptive information.	String	N	1

4.2.3 Logical Data Model codelists

4.2.3.1 Domain values:

Table 3 presents the different domain values used for the Historical flood events dataset.

Code list	Value	Definition
Flood Cause	freshet	The temporary inundation by water of normally dry land caused by a thaw period. The thaw period is often accompanied by precipitation that adds to the surface runoff produced by melting snow. The thaw can also cause ice jams and flooding due to rising water tables.
	heavy rain	The temporary inundation by water of normally dry land, whether adjacent to a river or not, caused by heavy rainfall events. Heavy rainfall flooding is common in urban areas where water temporarily accumulates due to more precipitation than can be removed by infiltration into the ground (e.g., due to impervious surfaces where infiltration is limited) or by drainage through infrastructure or the river system. Heavy precipitation and storm surges can be accompanied by high winds, as in the case of post-tropical cyclones. In mountainous areas, heavy precipitation accompanied by a rise in temperature will have an impact on the supply of meltwater from the snow cover on the peaks.
	coastal storm	Coastal flooding can be defined as flooding associated with a defined shoreline along an ocean or large lake. This can be due to a combination of high tides, storm surges, wind and wave effects, rising sea levels and riverine flooding (NRCan, PSC, 2018). A coastal storm is often accompanied by heavy precipitation.
	beaver dam failure	The inundation by water of normally dry land, caused by the breaking of a beaver dam.
	frazil	The temporary inundation by water of normally dry land adjacent to a river, caused by a blockage in the flow of river water due to the accumulation of frazil or ice in the bed of the watercourse during a period of frost.
	dam failure	The inundation by water of normally dry land, caused by the failure of a man-made dam.
	municipal water main break	The inundation by water of normally dry land caused by the breakage of a water main.
	tsunami	Tsunamis are large waves or series of waves generated by the rapid displacement of large volumes of water due to seismic events, volcanic eruptions, landslides, glacier calving, meteorite impacts, and other disturbances.
	unknown	The flooding mechanism is not known.
Province or Territory	AB	Alberta
	BC	British Columbia
	MB	Manitoba
	NL	Newfoundland and Labrador
	NB	New Brunswick
	NS	Nova Scotia

	NT	Northwest Territories
	NU	Nunavut
	ON	Ontario
	PE	Prince Edward Island
	QC	Québec
	SK	Saskatchewan
	YU	Yukon
Season	spring	Spring
	summer	Summer
	fall	Fall
	winter	Winter
	unknown	The season is not known.
Boolean	yes	Yes
	no	No
	unknown	Unknown

4.3 REFERENCE TO SPECIFICATION SCOPE

Main

5 REFERENCE SYSTEMS

5.1 SPATIAL REFERENCE SYSTEM

Data is available in geographic coordinates of latitude (φ) and longitude (λ) according to the North American Datum of 1983 in Canadian Spatial Reference System (NAD83(CSRS) - EPSG:4617). The longitude is expressed with a negative number to represent a position to the west of the central meridian (0°)

Web services are also published according to the NAD83/ Canada Atlas Lambert (EPSG: 3978) projection.

5.1.1 Authority

5.1.1.1 Title

EPSG Geodetic Parameter Registry:

URL: http://www.epsg-registry.org

5.1.1.2 Date

2011-08-17

5.1.1.3 Date type code

002 - Publication

5.1.1.4 Responsible party

OGP - International Association of Oil and Gas Producers

URL : http://www.epsg.org (en anglais seulement)

5.1.2 Code

Coordinate Reference System Identifier(s) (CRSID)

EPSG 3978 (web services)

EPSG 4617 (data for download)

5.1.3 Code space

EPSG - European Petroleum Survey Group

5.2 REFERENCE TO SPECIFICATION SCOPE

Main

6 DATA QUALITY

6.1 COMPLETENESS

Disparities in content between the various sources result in an inconsistent product. No warranty is given as to the accuracy or completeness of the information provided. The absence of information does not mean that no flooding has occurred.

6.2 CONSISTENCY

6.2.1 Conceptual Consistency

Not applicable

6.2.2 Domain Consistency

The various domains of the product are validated against the feature catalogue.

6.2.3 Format Consistency

The use of well-established commercial software to generate the product ensures consistency in its format.

6.2.4 Topological Consistency

Not applicable

6.3 POSITIONAL ACCURACY

6.3.1 Absolute or external accuracy

Unknown

6.3.2 Relative or internal accuracy

Unknown

6.4 TEMPORAL ACCURACY

6.4.1 Accuracy of a Time Measurement

Unknown

6.4.2 Temporal Consistency

Unknown

6.4.3 Temporal Validity

Unknown

6.5 THEMATIC ACCURACY

6.5.1 Classification Correctness

Unknown

6.5.2 Non Quantitative Attribute Correctness

Unknown

6.5.3 Quantitative Attribute Accuracy

Unknown

6.5.4 Reference to specification scope

Main

7 DATA CAPTURE

7.1 DESCRIPTION

Unknown

7.2 REFERENCE TO SPECIFICATION SCOPE

Main.

8 DATA MAINTENANCE

8.1 DESCRIPTION

The frequency of updates is irregular.

8.2 REFERENCE TO SPECIFICATION SCOPE

Main

9 DATA PRODUCT DELIVERY

The data product can be accessed via a web map service (WMS) or downloaded from an ftp site.

9.1 DELIVERY FORMAT INFORMATION: GEOPACKAGE

9.1.1 Format Name

GeoPackage Encoding Standard

9.1.2 Version

1.2.1

9.1.3 Specification

GeoPackage–1.2.1, OpenGIS® Implementation Specifications, OGC Recommendation Paper, 2018-09-06, OGC Document Number 12-128r15 (http://www.geopackage.org/spec121/)

9.1.4 Language

eng - English

fra - French

9.1.5 Character set

004 – UTF8

9.2 DELIVERY FORMAT INFORMATION: FGDB

9.2.1 Format Name

File Geodatabase - ESRI™

9.2.2 Version

Unknown (Outside the public domain)

9.2.3 Specification

Not available. This format was launched with the ArcGIS (ESRI™) software, version 9.2.

9.2.4 Language

eng - English

fra – French

9.3 DELIVERY MEDIUM INFORMATION FOR STATIC FILES

9.3.1 Units of delivery

Canada

9.3.2 Transfer Size

Variable

9.3.3 Medium Name

Open Government of Canada website (http://open.canada.ca/en/open-maps).

9.3.4 Additional delivery information

The data product is freely distributed under the Open Government Licence - Canada (http://open.canada.ca/en/open-government-licence-canada).

9.4 REFERENCE TO SPECIFICATION SCOPE

Main

10 METADATA

The metadata requirements follow the Government of Canada's Treasury Board Standard on Geospatial Data (ISO 19115).

Metadata for each Flood in Canada product contains the following information:

1) Unique identification information
2) Date information
3) Series information
4) Brief description
5) Detailed description
6) Spatial reference information

7) Geographic extent information
8) Distribution information
9) Information on distribution constraints