

ISO 19131 AAFC Watersheds Project - 2013 – Data Product Specification

Revision: A

Data specification: AAFC Watersheds Project – 2013

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Data specification: AAFC Watersheds Project – 2013

1. OVERVIEW

1.1. Informal description

The “Agriculture and Agri-Food Canada’s (AAFC) Watersheds Project - 2013” level series supplies a collection of watershed-related datasets for the Prairie Provinces. The levels are greater or smaller assemblages of drainage areas, or their components. The Project is organized by hydrometric gauging station.

The Project area, designed for the Prairie Provinces, covers all of Alberta, Saskatchewan and Manitoba, and those portions of British Columbia, Northwest Territories, Nunavut, Ontario, and the United States required to complete the trans-border portions of Prairie Provinces’ watersheds.

The 16 published datasets are generated from three source working datasets.

1.2. Data product specification metadata

This section provides metadata about the creation of this data product specification.

Dataset title:	AAFC Watersheds Project - 2013
Dataset reference date:	2013-12-31
Dataset responsible party:	Agri-Geomatics
Dataset language:	English, French
Dataset topic category:	Inland Waters

1.3. Terms and definitions

Fedoruk, Alex N., 1970, Proposed Watershed Divisions of Manitoba, Manitoba Department of Mines and Natural Resources, Canada Land Inventory, Report #10, Winnipeg, Manitoba, 89 pp.

Godwin, R. B. and F. R. J. Martin, 1975, Calculation of Gross and Effective Drainage Areas for the Prairie Provinces, Canadian Hydrology Symposium - 1975 Proceedings, Winnipeg, Manitoba, 5 pp.

Martin, F. R. J., 2001, Addendum No. 8 to Hydrology Report #104, Agriculture and Agri-Food Canada, PFRA Technical Service, Regina, Saskatchewan, 109 pp.

PFRA Hydrology Division, 1983, The Determination of Gross and Effective Drainage Areas in the Prairie Provinces, Hydrology Report #104, Agriculture Canada, PFRA Engineering Branch, Regina, Saskatchewan, 22 pp.

Statistics Canada. (n.d.). Additional information on SDAC. In *Standard drainage area classification*. Retrieved November 9, 2012. From <http://www.statcan.gc.ca/subjects-sujets/standard-norme/sdac-ctad/sdacinfo3-ctadinfo3-eng.htm>.

Statistics Canada. (n.d.). Information on Standard Drainage Area Classification (SDAC) 2003. In *Standard drainage area classification*. Retrieved November 9, 2012. From <http://www.statcan.gc.ca/subjects-sujets/standard-norme/sdac-ctad/sdacinfo1-ctadinfo1-eng.htm>.

Stichling, W. and S. R. Blackwell, 1957, Drainage Area as a Hydrologic Factor on the Glaciated Canadian Prairies, IUGG Proceedings, Volume 111, Toronto, Ontario, 12 pp.

- Feature attribute
characteristic of a feature
- Class
description of a set of objects that share the same attributes, operations, methods, relationships, and semantics [UML Semantics]

NOTE: A class does not always have an associated geometry (e.g. the metadata class).

- **Feature**
abstraction of real world phenomena
- **Object**
entity with a well-defined boundary and identity that encapsulates state and behaviour [UML Semantics]
NOTE: An object is an instance of a class.
- **Package**
grouping of a set of classes, relationships, and even other packages with a view to organizing the model into more abstract structures

1.4. Abbreviations

AAFC	Agriculture and Agri-Food Canada
EPSG	European Petroleum Survey Group
GIS	Geographic Information System
GML	Geography Markup Language
HTTP	Hypertext Transfer Protocol
NAD27	North American Datum of 1927
NAD83	North American Datum of 1983
NADCON	North American Datum Conversion Utility
NTS	National Topographic System
NTV2	National Transformation Version 2
OGC	Open Geospatial Consortium Inc.
PFRA	Prairie Farm Rehabilitation Administration
SDAC	Standard Drainage Area Classification
SDE	Spatial Database Engine
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
WSC	Water Survey of Canada

2. SPECIFICATION SCOPE

This data specification has only one scope, the general scope.

NOTE: The term 'specification scope' originates from the International Standard ISO19131. 'Specification scope' does not express the purpose for the creation of a data specification or the potential use of data, but identifies partitions of the data specification where specific requirements apply.

3. DATA PRODUCT IDENTIFICATION

3.1. Data Series Identification

Title:

AAFC Watershed Project – 2013

Alternate title:

none

Abstract:

The Agriculture and Agri-Food Canada's (AAFC) Watersheds Project level series supplies a number of watershed and watershed related datasets for the Prairie Provinces. The levels are greater or smaller assemblages of hydrometric areas, or the components defining them.

The Project is organized by hydrometric gauging stations which are sourced from Environment Canada, the United States, and Canadian provinces. Additional stations were generated to address structural issues, like river confluences or lake inlets. Collectively, they are referred to as the gauging stations, or simply, the stations.

The drainage area that each station monitors, between itself and one or more of its upstream neighbours, is called an 'incremental gross drainage area'.

The incremental gross drainage areas are collected into larger or smaller groupings based on size or defined interest to generate the various 'levels' of the series. They include:

Basins of varying size:

1. Major drainage systems (3): Arctic Ocean, Hudson Bay and Gulf of Mexico;
2. Major basins (23): associated with river or lake reaches;
3. Project sub-basins (47): created specifically for the project;
4. Sub-basins (51): based on specific Environment Canada hydrometric gauging station locations;
5. Sub-sub-basins (311): based on specific Environment Canada hydrometric gauging station locations;

Incremental drainage areas:

6. Incremental gross drainage areas: one per gauging station.

The incremental gross drainage areas are further subdivided into portions that either contribute or do not contribute to drainage to an average runoff event. The portions that do contribute are called 'effective drainage' areas, while those that don't are called 'non-contributing'. These generate the following levels:

7. Incremental effective drainage areas; and
8. Incremental non-contributing areas.

Total drainage areas:

9. Total gross drainage areas;
10. Total effective drainage areas; and
11. Total non-contributing areas;

And when combined for the entire project, yields the:

12. Effective drainage area.

The series also includes the components:

13. The gauging stations;
14. The collection of boundaries (lines) of the gross incremental drainage areas as well as the boundaries that separate contributing from non-contributing areas for an average runoff event; and
15. A network of downstream-directed lines that connect the gauging stations.

All linework is derived from large scale topographic data.

One additional non-spatial dataset, a table of tallied values by gauging station, is provided:

16. The Project Gauging Station Table.

The Project area, designed for the Prairie Provinces, covers all of Alberta, Saskatchewan and Manitoba, and those portions of British Columbia, Northwest Territories, Nunavut, Ontario, and the United States that are required to complete the trans-border sections of the watersheds.

Since 1975 the AAFC Watersheds Project has systematically collected and refined watershed boundaries for the Prairies. The result is the authoritative source for gross and effective drainage areas in the Prairie Provinces. The initial 1:50,000 analog delineations were moved to their digital form in 1994. Since then, the delineations have increased in accuracy and extent, and the series levels have increased to 16 in number.

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. It was available to all potential users. Over the years many geospatial datasets have evolved. This collection of datasets is useful for hydrologic analyses, dataset development, and creating maps for watershed management projects.

Topic category:

Inland Waters

Spatial representation type:

Vector, Text Table

Spatial resolution:

Sourced from datasets of scales 1:50,000 and 1:20,000.

Geographic description:

This specification is applicable to the extent of Western Canada.

Constraints:

Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence-canada>)

Keywords:

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of Canada Core Subject Thesaurus, 2000-02-01)

Scope:

series

3.2. Data product identification

3.2.1. Effective drainage area of the AAFC Watersheds project - 2013

Title:

Effective Drainage Area of the AAFC Watersheds Project – 2013.
(HYD_AAFC_EFF_DRAIN_AREA)

Abstract:

The "Effective Drainage Area of the AAFC Watersheds Project - 2013" dataset is a geospatial data layer containing polygon features representing the areas of the Agriculture and Agri-Food Canada's (AAFC) Watersheds Project that could, for the entire project areas, be expected to contribute to surface runoff under average runoff conditions.

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. The database was available to all

potential users. Over the years many geospatial data layers have evolved. This dataset provides a footprint of the areas of the Agriculture and Agri-Food Canada's (AAFC) Watersheds Project that could be expected to contribute surface runoff under average runoff conditions. It is provided for hydrologic analyses and for creating maps for watershed management projects and other types of project.

Spatial representation type:

Vector

Constraints:Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence-canada>)**Keywords:**

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of Canada Core Subject Thesaurus, 2000-02-01)

Scope:

dataset

Feature Attribute Names:

Effective or Non-contributing Flag

3.2.2. Hydrometric gauging stations of the AAFC Watersheds project - 2013**Title:**Hydrometric Gauging Stations of the AAFC Watersheds Project - 2013
(HYD_AAFC_GAUGING_STATION)**Abstract:**

The "Hydrometric Gauging Stations of the AAFC Watersheds Project - 2013" dataset is a geospatial data layer containing point features representing the hydrometric gauging stations of the Agriculture and Agri-Food Canada (AAFC) Watersheds Project. The gauging stations are sourced from Environment Canada, the United States and Canadian provinces. Additional virtual stations have been generated to address hydrometric structural issues, like river confluences or lake inlets. Attribute information includes station identification, location, and associated catchments/basins.

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. The database was available to all potential users. Over the years many geospatial data layers have evolved. These gauging stations and their associated information were used in the Project to define drainage areas. They are available for hydrologic analyses, the generation of hydrologic datasets, and for creating maps for watershed management or other types of project.

Spatial representation type:

Vector

Constraints:Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence-canada>)**Keywords:**

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of Canada Core Subject Thesaurus, 2000-02-01)

Scope:

dataset

Feature Attribute Names:

Gauging Station Number, Gauging Station Name (English attribute data), Gauging Station Name (French attribute data), Gauging Station Type, Primacy Code, Sub-sub-basin Code,

Sub-basin Code, PFRA Sub-basin Name (English attribute data), PFRA Sub-basin Name (French attribute data), Major Basin Name (English attribute data), Major Basin Name (French attribute data), Major System Name (English attribute data), Major System Name (French attribute data), Authority, Political Jurisdiction, Legal Land Description, Latitude and Longitude, Incremental Gross Drainage Area (sq. km), Incremental Effective Drainage Area (sq. km), Sum of Non-contributing Areas of an Incremental Gross Drainage Area (sq. km), Total Gross Drainage Area (sq. km), Total Effective Drainage Area (sq. km), Sum of Non-contributing Areas of a Total Gross Drainage Area (sq. km), Unique Station Identifier,

3.2.3. Gross and effective drainage areas for hydrometric gauging stations of the AAFC Watersheds project - 2013

Title:

Gross and Effective Drainage Areas for Hydrometric Gauging Stations of the AAFC Watersheds Project – 2013 (HYD_AAFC_GAUGING_STN_TBL)

Abstract:

The “Gross and Effective Drainage Areas for Hydrometric Gauging Stations of the AAFC Watersheds Project - 2013” dataset is a table that provides the calculated gross and effective drainage areas associated with the hydrometric gauging stations of the Agriculture and Agri-Food Canada (AAFC) Watersheds Project. Areas are provided in square kilometres. ‘Gross drainage’ describes the total area of a catchment. ‘Effective drainage’ describes areas that are expected to contribute to an average runoff.

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. The database was available to all potential users. Over the years many geospatial data layers have evolved. This table of gross and effective drainage area calculations by gauging station most closely reflects the original purpose of the Project. It still is provided for hydrologic analyses and for creating maps for watershed management or other types of project.

Spatial representation type:

Text Table

Constraints:

Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence-canada>)

Keywords:

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of Canada Core Subject Thesaurus, 2000-02-01)

Scope:

dataset

Feature Attribute Names:

Gauging Station Number, Gauging Station Name (English attribute data), Gauging Station Name (French attribute data), Political Jurisdiction, Legal Land Description, Latitude and Longitude, Total Gross Drainage Area (sq. km), Total Effective Drainage Area (sq. km), Relocated-station Flag (English attribute data), Relocated-station Flag (French attribute data), Closed Drainage Basin Flag (English attribute data), Closed Drainage Basin Flag (French attribute data)

3.2.4. Hydrometric gauging station network of the AAFC Watersheds project - 2013

Title:

Hydrometric Gauging Station Network of the AAFC Watersheds Project – 2013 (HYD_AAFC_GAUGING_STN_NETWORK)

Abstract:

The “Hydrometric Gauging Station Network of the AAFC Watersheds Project - 2013” dataset is a geospatial data layer containing network line features representing links between hydrometric gauging stations of the Agriculture and Agri-Food Canada (AAFC) Watersheds Project. Each line connects a gauging station to its downstream neighbour(s), indicating its drainage direction.

This network is a ‘drainage’ network, not a ‘stream’ network. That is, the lines do not in any way portray the actual stream path between stations.

In some instances, a lake, for example, an area may have several gauging stations. In such cases, one of the gauging stations is designated the ‘primary’ gauging station for calculation purposes, and to maintain proper hydraulic relationships between gauging stations, where only the primary stations are connected to the downstream portion of the network.

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. The database was available to all potential users. Over the years many geospatial data layers have evolved. This flow network is essential in determining drainage areas for the Project and is provided for hydrologic analyses and creating maps for watershed management or other types of project.

Spatial representation type:

Vector

Constraints:

Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence-canada>)

Keywords:

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of Canada Core Subject Thesaurus, 2000-02-01)

Scope:

dataset

Feature Attribute Names:

Areas Calculation Flag, Upstream Station Identifier, Downstream Station Identifier

3.2.5. Gross and effective drainage area boundaries of the AAFC watersheds project - 2013

Title:

Gross and Effective Drainage Area Boundaries of the AAFC Watersheds Project – 2013 (HYD_AAFC_GROSS_EFF_LINE)

Abstract:

The “Gross and Effective Drainage Area Boundaries of the AAFC Watersheds Project - 2013” dataset is a geospatial data layer containing line features representing boundaries associated with the ‘incremental gross drainage areas’ of the Agriculture and Agri-Food Canada (AAFC) Watersheds Project.

The project is subdivided by hydrometric gauging station. The maximum area that could contribute runoff to each station, less that of its upstream neighbour(s) is called its ‘incremental gross drainage area’.

Two types of boundary are provided: ‘gross’ and ‘effective’. ‘Gross’ boundaries separate adjacent incremental gross drainage areas. ‘Effective’ boundaries delimit, within each incremental gross drainage area, the separation between areas that supply runoff, based on average runoff, from those that don’t.

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. The database was available to all potential users. Over the years many geospatial data layers have evolved.

This dataset provides incremental gross and effective drainage area boundaries for a large portion of Western Canada. It is useful in developing other datasets in this series and for hydrologic analyses, dataset development and creating maps for watershed management projects.

Spatial representation type:

Vector

Constraints:

Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence-canada>)

Keywords:

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of Canada Core Subject Thesaurus, 2000-02-01)

Scope:

dataset

Feature Attribute Names:

Drainage Boundary Type

3.2.6. Incremental effective drainage areas of the AAFC watersheds project - 2013**Title:**

Incremental Effective Drainage Areas of the AAFC Watersheds Project – 2013 (HYD_AAFC_INCRML_EFF_DRAIN)

Abstract:

The “Incremental Effective Drainage Areas of the AAFC Watersheds Project– 2012” dataset is a geospatial data layer containing polygon features representing the portions of each incremental gross drainage area of the Agriculture and Agri-Food Canada (AAFC) Watersheds Project that could be expected to contribute to surface runoff under average runoff conditions.

An ‘incremental gross drainage area’ is a hydrometric gauging station's drainage basin, less that of the next upstream gauging station(s). ‘Effective drainage’ occurs in areas that are expected to supply surface runoff in an average runoff.

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. The database was available to all potential users. Over the years many geospatial data layers have evolved. This collection of incremental effective drainage areas provides a basis for hydrologic analyses and for creating maps for watershed management projects or other types of projects.

Spatial representation type:

Vector

Constraints:

Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence-canada>)

Keywords:

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of Canada Core Subject Thesaurus, 2000-02-01)

Scope:

dataset

Feature Attribute Names:

Gauging Station Number, Gauging Station Type, Incremental Gross Drainage Area (sq. km), Incremental Effective Drainage Area (sq. km), Unique Station Identifier

3.2.7. Incremental gross drainage areas of the AAFC watersheds project - 2013

Title:

Incremental Gross Drainage Areas of the AAFC Watersheds Project – 2013
(HYD_AAFC_INCRML_GROSS_DRAIN)

Abstract:

The “Incremental Gross Drainage Areas of the AAFC Watersheds Project - 2013” dataset is a geospatial data layer containing polygon features representing the incremental gross drainage areas of the Agriculture and Agri-Food Canada (AAFC) Watersheds Project.

The Project area is subdivided by hydrometric gauging station. The maximum area that could contribute runoff to each station, less that of its upstream neighbour(s) is called an ‘incremental gross drainage area’.

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. The database was available to all potential users. Over the years many geospatial data layers have evolved. The dataset provides delineations of ‘incremental gross drainage areas’ for hydrologic analyses and creating maps for watershed management projects for most of Western Canada.

Spatial representation type:

Vector

Constraints:

Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence-canada>)

Keywords:

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of Canada Core Subject Thesaurus, 2000-02-01)

Scope:

dataset

Feature Attribute Names:

Gauging Station Number, Gauging Station Name (English attribute data), Gauging Station Name (French attribute data), Gauging Station Type, Primacy Code, Sub-sub-basin Code, Sub-basin Code, PFRA Sub-basin Name (English attribute data), PFRA Sub-basin Name (French attribute data), Major Basin Name (English attribute data), Major Basin Name (French attribute data), Major System Name (English attribute data), Major System Name (French attribute data), Authority, Political Jurisdiction, Legal Land Description, Latitude and Longitude, Incremental Gross Drainage Area (sq. km), Incremental Effective Drainage Area (sq. km), Sum of Non-contributing Areas of an Incremental Gross Drainage Area (sq. km), Total Gross Drainage Area (sq. km), Total Effective Drainage Area (sq. km), Sum of Non-contributing Areas of a Total Gross Drainage Area (sq. km), Unique Station Identifier

3.2.8. Non-contributing portions of the incremental gross drainage areas of the AAFC watersheds project - 2013

Title:

Non-Contributing Portions of the Incremental Gross Drainage Areas of the AAFC Watersheds Project – 2013 (HYD_AAFC_INCRML_NON_CTRB_DRAIN)

Abstract:

The “Non-contributing Portions of the Incremental Gross Drainage Areas of the AAFC Watersheds Project – 2013” dataset is a geospatial data layer containing polygon features

representing the areas within each incremental gross drainage area of the Agriculture and Agri-Food Canada (AAFC) Watersheds Project that DO NOT contribute to average runoff.

The Project is subdivided by hydrometric gauging station. The maximum area that could contribute runoff to each gauging station, less that of its upstream neighbour(s) is called an “incremental gross drainage area”.

The “incremental gross drainage” areas can be subdivided into portions that either supply surface runoff to an average runoff, or do not. Those portions that are NOT part of the effective drainage area are called ‘non-contributing’.

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. The database was available to all potential users. Over the years many geospatial data layers have evolved. These non-contributing areas are provided for hydrologic analyses, the generation of hydrologic datasets, and for creating maps for watershed management or other types of project.

Spatial representation type:

Vector

Constraints:

Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence-canada>)

Keywords:

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of Canada Core Subject Thesaurus, 2000-02-01)

Scope:

dataset

Feature Attribute Names:

Gauging Station Number, Gauging Station Type, Unique Station Identifier

3.2.9. Major drainage systems of the AAFC watersheds project - 2013

Title:

Major Drainage Systems of the AAFC Watersheds Project – 2013
(HYD_AAFC_MAJ_DRAINAGE_SYS)

Abstract:

The “Major Drainage Systems of the AAFC Watersheds Project - 2013” dataset is a geospatial data layer containing polygon features representing the three (3) major drainage system basins of the Agriculture and Agri-Food Canada (AAFC) Watersheds Project. The Project area has been split according to which body of water it drains: the Arctic Ocean, Hudson Bay or Gulf of Mexico.

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. The database was available to all potential users. Over the years many geospatial data layers have evolved. This dataset of major drainage systems is provided for hydrologic analyses, the generation of hydrologic datasets, and for creating maps for watershed management or other types of project.

Spatial representation type:

Vector

Constraints:

Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence-canada>)

Keywords:

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of

Canada Core Subject Thesaurus, 2000-02-01)

Scope:

dataset

Feature Attribute Names:

Major System Name (English attribute data), Major System Name (French attribute data)

3.2.10. Major basins of the AAFC watersheds project - 2013**Title:**

Major Basins of the AAFC Watersheds Project – 2013 (HYD_AAFC_MAJOR_BASIN)

Abstract:

The “Major Basins of the AAFC Watersheds Project - 2013” dataset is a geospatial data layer containing polygon features representing the 23 major basins of the Agriculture and Agri-Food Canada (AAFC) Watersheds Project.

The Project is subdivided by ‘incremental gross drainage areas’ associated to individual hydrometric gauging stations. The maximum area that could contribute runoff to each gauging station, less that of its upstream neighbour(s) is called an ‘incremental gross drainage area’. Conceptually, the major basins are collections of the “incremental gross drainage areas” associated with particular major river or lake reach (for example, reaches of the Saskatchewan or Athabasca River). In practice, each major basin consists of the collection of incremental gross drainage areas, whose gauging stations’ numbers have collections of the same three first characters. For example, the Assiniboine River major basin contains the incremental gross drainage areas whose gauging station numbers start with 05J, 05M, or 05N.

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. The database was available to all potential users. Over the years many geospatial data layers have evolved. The prairie major basins are provided for hydrologic analyses, the generation of hydrologic datasets, and for creating maps for watershed management or other types of project.

Spatial representation type:

Vector

Constraints:

Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence-canada>)

Keywords:

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of Canada Core Subject Thesaurus, 2000-02-01)

Scope:

dataset

Feature Attribute Names:

Major Basin Name (English attribute data), Major Basin Name (French attribute data),

3.2.11. PFRA sub-basins of the AAFC watersheds project - 2013**Title:**

PFRA Sub-basins of the AAFC Watersheds Project – 2013 (HYD_AAFC_PF_SUB_BASIN)

Abstract:

The “PFRA Sub-basins of the AAFC Watersheds Project – 2013” dataset is a geospatial data layer containing polygon features representing the 47 sub-basins within the Agriculture and Agri-Food Canada (AAFC) Watersheds Project, tailored for the Prairie Farm Rehabilitation Administration (PFRA) business needs.

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. The database was available to all potential users. Over the years many geospatial data layers have evolved. These PFRA sub-basins were provided for hydrologic analyses to meet their business needs. They are available to others for hydraulic analyses, the generation of hydrologic datasets, and for creating maps for watershed management or other types of project.

Spatial representation type:

Vector

Constraints:

Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence-canada>)

Keywords:

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of Canada Core Subject Thesaurus, 2000-02-01)

Scope:

dataset

Feature Attribute Names:

PFRA Sub-basin Name (English attribute data), PFRA Sub-basin Name (French attribute data)

3.2.12. Sub-basins of the AAFC watersheds project - 2013**Title:**

Sub-basins of the AAFC Watersheds Project – 2013 (HYD_AAFC_SUB_BASIN)

Abstract:

The “Sub-basins of the AAFC Watersheds Project – 2013” dataset is a geospatial data layer containing polygon features representing the Standard Drainage Area Classification (SDAC) 2003 defined sub-drainages of the Agriculture and Agri-Food Canada (AAFC) Watersheds Project.

Canada has eleven major drainage areas which are divided into 164 sub-drainage areas. All drainage areas and sub-drainage areas are named and have an identifying ‘number’. Sub-drainage areas have ‘numbers’ that share a common ‘three-character’ designation. For example, the 05A sub-basin contains stations ‘numbered’ 05AB006 and 05AC007.

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. The database was available to all potential users. Over the years many geospatial data layers have evolved. The sub-basins are provided for hydrologic analyses and for creating maps for watershed management or other types of projects.

Spatial representation type:

Vector

Constraints:

Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence-canada>)

Keywords:

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of Canada Core Subject Thesaurus, 2000-02-01)

Scope:

dataset

Feature Attribute Names:

Sub-basin Code

3.2.13. Sub-sub-basins of the AAFC watersheds project - 2013**Title:**

Sub-sub-basins of the AAFC Watersheds Project – 2013 (HYD_AAFC_SUB_SUB_BASIN)

Abstract:

The “Sub-sub-basins of the AAFC Watersheds Project – 2013” dataset is a geospatial data layer containing polygon features representing the Standard Drainage Area Classification (SDAC) 2003 defined sub-sub-drainage areas of the Agriculture and Agri-Food Canada (AAFC) Watersheds Project.

Canada has eleven major drainage areas which are divided into 164 sub-drainage areas; the 164 sub-drainage areas are then further divided into 978 sub-sub-drainage areas. All drainage areas, sub-drainage areas and sub-sub-drainage areas are named and have an identifying ‘number’. Sub-sub-drainage areas have ‘numbers’ that share a common ‘four-character’ designation. For example, the 05AB sub-sub-basin contains amongst others, station 05AB006, while the 05AC sub-sub-basin contains station 05AC007 (and others).

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. The database was available to all potential users. Over the years many geospatial data layers have evolved. The sub-sub-basins are provided for hydrologic analyses and for creating maps for watershed management or other types of project.

Spatial representation type:

Vector

Constraints:

Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence-canada>)

Keywords:

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of Canada Core Subject Thesaurus, 2000-02-01)

Scope:

dataset

Feature Attribute Names:

Sub-sub-basin Code

3.2.14. Total effective drainage areas of the AAFC watersheds project - 2013**Title:**Total Effective Drainage Areas of the AAFC Watersheds Project – 2013
(HYD_AAFC_TOTAL_EFF_DRAIN)**Abstract:**

The "Total Effective Drainage Areas of the AAFC Watersheds Project – 2013" dataset is a geospatial data layer containing polygon features representing the areas within the “total gross drainage areas” of each hydrometric gauging station of the Agriculture and Agri-Food Canada (AAFC) Watersheds Project that would contribute to average runoff.

A ‘total gross drainage area’ is the maximum area that could contribute runoff for a single gauging station – the ‘total effective drainage areas’ are those parts of that ‘total gross drainage area’ that would contribute surface runoff to an average runoff. For each “total gross drainage area” there can be only one “total effective drainage areas”.

These polygons may overlap with those from other gauging stations' "total gross drainage area", as upstream land surfaces form part of multiple downstream gauging stations' "total gross drainage areas".

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. The database was available to all potential users. Over the years many geospatial data layers have evolved. The collection of total effective drainage areas provides a basis for hydrologic analyses and for creating maps for watershed management projects or other types of projects.

Spatial representation type:

Vector

Constraints:

Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence-canada>)

Keywords:

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of Canada Core Subject Thesaurus, 2000-02-01)

Scope:

dataset

Feature Attribute Names:

Gauging Station Number, Gauging Station Name (English attribute data), Gauging Station Name (French attribute data), Total Gross Drainage Area (sq. km), Total Effective Drainage Area (sq. km), Sum of Non-contributing Areas of a Total Gross Drainage Area (sq. km), Unique Station Identifier

3.2.15. Total gross drainage areas of the AAFC watersheds project - 2013

Title:

Total Gross Drainage Areas of the AAFC Watersheds Project – 2013
(HYD_AAFC_TOTAL_GROSS_DRAIN)

Abstract:

The "Total Gross Drainage Areas of the AAFC Watersheds Project - 2013" dataset is a geospatial data layer containing polygon features representing the maximum area that could contribute surface runoff (total gross drainage areas) for each gauging station of the Agriculture and Agri-Food Canada (AAFC) Watersheds Project.

These polygons overlap as upstream land surfaces form part of multiple downstream gauging stations' total gross drainage areas.

Drainage area includes all land whose surface runoff contributes to the same drainage outlet or gauging station. Many gauging stations share the same headwaters, thus the overlapping areas (or polygons). The majority of the drainage areas in this dataset have shared areas.

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. The database was available to all potential users. Over the years many geospatial data layers have evolved. The dataset provides 'total gross drainage areas' of the AAFC Watersheds Project. It is useful for hydrologic analyses and creating maps for watershed management projects.

Spatial representation type:

Vector

Constraints:

Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence->

[canada](#))

Keywords:

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of Canada Core Subject Thesaurus, 2000-02-01)

Scope:

dataset

Feature Attribute Names:

Gauging Station Number, Gauging Station Name (English attribute data), Gauging Station Name (French attribute data), Total Gross Drainage Area (sq. km), Total Effective Drainage Area (sq. km), Sum of Non-contributing Areas of a Total Gross Drainage Area (sq. km), Unique Station Identifier

3.2.16. Areas of non-contributing drainage within total gross drainage areas of the AAFC watersheds project - 2013

Title:

Areas of Non-Contributing Drainage within Total Gross Drainage Areas of the AAFC Watersheds Project – 2013 (HYD_AAFC_TOTAL_NON_CTRB_DRAIN)

Abstract:

The "Areas of Non-Contributing Drainage within Total Gross Drainage Areas of the AAFC Watersheds Project - 2013" dataset is a geospatial data layer containing polygon features representing the areas within the "total gross drainage areas" of each gauging station of the Agriculture and Agri-Food Canada (AAFC) Watersheds Project that DO NOT contribute to average runoff.

A "total gross drainage area" is the maximum area that could contribute runoff for a single gauging station – the "areas of non-contributing drainage" are those parts of that "total gross drainage area" that DO NOT contribute to average runoff. For each "total gross drainage area" there can be none to several unconnected "areas of non-contributing drainage".

These polygons may overlap with those from other gauging stations' "total gross drainage area", as upstream land surfaces form part of multiple downstream gauging stations' "total gross drainage areas".

Purpose:

Originally, the Project was to generate a drainage area database intended to provide the basis for updating regional flood and runoff studies. The database was available to all potential users. Over the years many geospatial data layers have evolved. These drainage areas are provided for hydrologic analyses, the generation of hydrologic datasets, and for creating maps for watershed management or other types of project.

Spatial representation type:

Vector

Constraints:

Open Government Licence - Canada (<http://data.gc.ca/eng/open-government-licence-canada>)

Keywords:

Watersheds, Hydrology, Water, Drainage, Inland Waters, Western Provinces (Government of Canada Core Subject Thesaurus, 2000-02-01)

Scope:

Dataset

Feature Attribute Names:

Gauging Station Number, Gauging Station Name (English attribute data), Gauging Station Name (French attribute data), Total Gross Drainage Area (sq. km), Total Effective Drainage Area (sq. km), Sum of Non-contributing Areas of a Total Gross Drainage Area (sq. km),

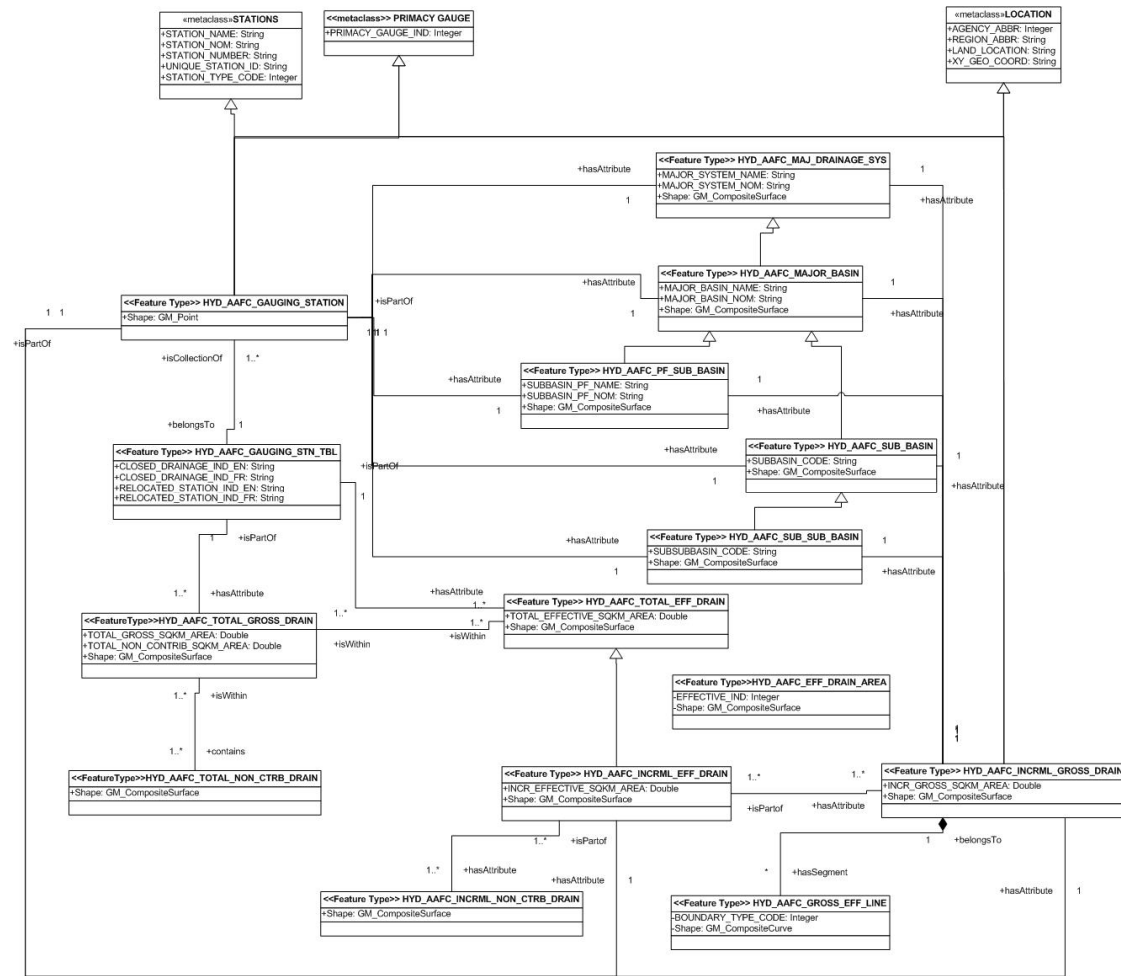
Unique Station Identifier

4. DATA CONTENT AND STRUCTURE

The AAFC Watersheds Project - 2013 data is structured by feature. An application schema, expressed in UML, details the content and an associated feature catalogue provides the semantics of the model elements.

The root feature types are the collection of source 'working' datasets that includes: the gauging stations (STATIONS), their associated boundaries (LINEWORK), and a network (NETWORK) linking the stations. These datasets contain all the information required to maintain, generate and populate the series' published datasets.

4.1. Feature-based application schema



4.2. Feature catalogue - AAFC Watersheds Project, Feature Catalog

Title: AAFC Watersheds Project
 Scope: Inland Waters
 Version Number: 1.0
 Version Date: 2013-12-31
 Producer: Agri-Geomatics

4.2.1. Feature attributes

4.2.1.1. Areas calculation flag

Name: Areas Calculation Flag (GROSS_ONLY_IND)
 Definition: A signal indicating whether a network segment needs to be present when calculating total effective and total gross drainage areas, for downstream gauging stations.

Aliases:

Value Data Type: Integer
 Value Domain Type: 1 (enumerated)
 Value Domain:

Feature Attribute Value:

Label:	Code:	Definition
both	0	Calculate both gross and effective drainage areas (i.e. segment stays in place for both calculations).
gross only	1	Calculate only total gross drainage areas (i.e. remove segment for effective area calculations).

4.2.1.2. Authority

Name: Authority (AGENCY_ABBR)
 Definition: The hydrometric jurisdictional authority responsible for naming the gauging station.

Aliases:

Value Data Type: Character
 Value Domain Type: 1 (enumerated)
 Value Domain:

Feature Attribute Value:

Label:	Code:	Definition
Alberta	AB	
Canada	CA	
Manitoba	MB	
Saskatchewan	SK	
United States / États-Unis	US	

4.2.1.3. Closed drainage basin flag (English attribute data)

Name: Closed Drainage Basin Flag (English attribute data) (CLOSED_DRAINAGE_IND_EN)
 Definition: Indicates a presence of an endorheic basin i.e. one with no surface drainage, even under very wet conditions. Value is either 'TRUE' or 'FALSE'.
 Aliases:
 Value Data Type: Character
 Value Domain Type: 0 (not enumerated)

4.2.1.4. Closed drainage basin flag (French attribute data)

Name: Closed Drainage Basin Flag (French attribute data) (CLOSED_DRAINAGE_IND_FR)
 Definition: Indicates a presence of an endorheic basin i.e. one with no surface drainage, even under very wet conditions. Value is either 'VRAI' or 'FAUX'.
 Aliases:
 Value Data Type: Character
 Value Domain Type: 0 (not enumerated)

4.2.1.5. Downstream station identifier

Name: Downstream Station Identifier (TO_STATION_ID)
 Definition: The unique station identifier of a gauging station through which the network segment drains.
 Aliases:
 Value Data Type: Character
 Value Domain Type: 0 (not enumerated)

4.2.1.6. Drainage boundary type

Name: Drainage Boundary Type (BOUNDARY_TYPE_CODE)
 Definition: Boundary type

Aliases:
 Value Data Type: Integer
 Value Domain Type: 1 (enumerated)
 Value Domain:

Feature Attribute Value:

Label:	Code:	Definition
effective	2	A boundary that splits the effective and non-contributing areas of an incremental gross drainage area.
gross	3	A boundary delimiting an incremental gross drainage area.

4.2.1.7. Effective or non-contributing flag

Name: Effective or Non-contributing Flag (EFFECTIVE_IND)
 Definition: An indicator of whether or not an area is expected to contribute to an average runoff.
 Aliases:
 Value Data Type: integer
 Value Domain Type: 0 (enumerated)
 Feature Attribute Value:

Label:	Code:	Definition
non-contributing	0	
effective	1	

4.2.1.8. Gauging station name (English attribute data)

Feature Attribute
 Name: Gauging Station Name (English attribute data) (STATION_NAME)
 Definition: The name assigned to gauging station. Example: Rogers Creek
 Aliases:
 Value Data Type: Character
 Value Domain Type: 0 (not enumerated)

4.2.1.9. Gauging station name (French attribute data)

Feature Attribute
 Name: Gauging Station Name (French attribute data) (STATION_NOM)
 Definition: The name assigned to gauging station. Example: le ruisseau Rogers
 Aliases:
 Value Data Type: Character
 Value Domain Type: 0 (not enumerated)

4.2.1.10. Gauging station number

Name: Gauging Station Number (STATION_NUMBER)
 Definition: The alpha-numeric 'number' assigned to a gauging station. Example: 05AB0123.
 Aliases:
 Value Data Type: Character
 Value Domain Type: 0 (not enumerated)

4.2.1.11. Gauging station type

Name: Gauging Station Type (STATION_TYPE_CODE)
 Definition: Type of gauging station.
 Aliases:
 Value Data Type: Integer
 Value Domain Type: 1 (enumerated)
 Value Domain:
 Feature Attribute Value:

Label:	Code:	Definition
Stream	1	
Lake	2	
Relocated	4	
Shoreline	5	
Misc.	500	Miscellaneous or no number

4.2.1.12. Incremental effective drainage area (sq. km)

Name: Incremental Effective Drainage Area (sq. km)
(INCR_EFFECTIVE_SQKM_AREA)

Definition: The planar area (in square kilometres) of the portion of the incremental gross drainage area expected to contribute to an average runoff. An incremental gross drainage area is defined as ‘the area of a gauging station’s (total) drainage area, less that of the next upstream station(s)’.

Aliases:

Value Data Type: Rational

Value Domain Type: 0 (not enumerated)

4.2.1.13. Incremental gross drainage area (sq. km)

Name: Incremental Gross Drainage Area (sq. km)
(INCR_GROSS_SQKM_AREA)

Definition: The planar area (in square kilometres) of an incremental gross drainage area. An incremental gross drainage area is defined as ‘the area of a gauging station’s (total) drainage area, less that of the next upstream station(s)’.

Aliases:

Value Data Type: Rational

Value Domain Type: 0 (not enumerated)

4.2.1.14. Latitude and longitude

Name: Latitude and Longitude (XY_GEO_COORD)

Definition: The geographic (latitude and longitude) coordinates of the location of a gauging station.

Aliases:

Value Data Type: Character

Value Domain Type: 0 (not enumerated)

4.2.1.15. Legal land description

Name: Legal Land Description (LAND_LOCATION)

Definition: The legal land description of the parcel of land on which the gauging station sits - based on township surveys, Dominion Land Survey, or other land survey system.

Aliases:

Value Data Type: Character

Value Domain Type: 0 (not enumerated)

4.2.1.16. Major basin name (English attribute data)

Name: Major Basin Name (MAJOR_BASIN_NAME)
Definition: The Water Survey of Canada's designated 'major basin' of the gauging station. These basins are associated with major river or lake reaches (for example, reaches of the Saskatchewan or Athabasca River).
Aliases:
Value Data Type: Character
Value Domain Type: 0 (not enumerated)

4.2.1.17. Major basin name (French attribute data)

Name: Major Basin Name (MAJOR_BASIN_NOM)
Definition: The Water Survey of Canada's designated 'major basin' of the gauging station. These basins are associated with major river or lake reaches (for example, reaches of the Rivière Saskatchewan or Rivière Athabasca River).
Aliases:
Value Data Type: Character
Value Domain Type: 0 (not enumerated)

4.2.1.18. Major system name (English attribute data)

Name: Major System Name (MAJOR_SYSTEM_NAME)
Definition: The Water Survey of Canada's designated 'major system' in which the gauging station is located. Within the Project area, they include Arctic Ocean, Hudson Bay or Gulf of Mexico.
Aliases:
Value Data Type: Character
Value Domain Type: 0 (not enumerated)

4.2.1.19. Major system name (French attribute data)

Name: Major System Name (MAJOR_SYSTEM_NOM)
Definition: The Water Survey of Canada's designated 'major system' in which the gauging station is located. Within the Project area, they include Océan Arctique, Baie d'Hudson or Golfe du Mexique.
Aliases:
Value Data Type: Character
Value Domain Type: 0 (not enumerated)

4.2.1.20. PFRA sub-basin name (English attribute data)

Name: PFRA Sub-basin Name (SUBBASIN_PF_NAME)
Definition: The Prairie Farm Rehabilitation Administration (PFRA) sub-basin name associated with a gauging station. These sub-basins were established for PFRA business requirements within the Agriculture and Agri-Food Canada (AAFC) Watersheds Project.
PFRA was an autonomous federal administration subsumed by Agriculture and Agri-Food Canada.
Aliases:
Value Data Type: Character
Value Domain Type: 0 (not enumerated)

4.2.1.21. PFRA sub-basin name (French attribute data)

Name: PFRA Sub-basin Name (SUBBASIN_PF_NOM)
 Definition: The Prairie Farm Rehabilitation Administration (PFRA) sub-basin name associated with a gauging station. These sub-basins were established for PFRA business requirements within the Agriculture and Agri-Food Canada (AAFC) Watersheds Project.
 PFRA was an autonomous federal administration subsumed by Agriculture and Agri-Food Canada.
 Aliases:
 Value Data Type: Character
 Value Domain Type: 0 (not enumerated)

4.2.1.22. Political jurisdiction

Name: Political Jurisdiction (REGION_ABBR)
 Definition: The political jurisdiction in which a gauging station is located. Can be a Canadian province or territory, or the United States (abbreviated).
 Aliases:
 Value Data Type: Character
 Value Domain Type: 1 (enumerated)
 Value Domain:

Feature Attribute Value:

Label:	Code:	Definition
Alberta	AB	
British Columbia / Colombie-Britannique	BC	
Manitoba	MB	
Northwest Territories / Territoires du Nord-Ouest	NT	
Nunavut	NU	
Ontario	ON	
Saskatchewan	SK	
United States / États-Unis	US	

4.2.1.23. Primacy code

Name: Primacy Code (PRIMACY_GAUGE_IND)
 Definition: Indicates whether or not a gauging station is a designated 'primary' station. In some instances (for example, a lake) a drainage area can have several gauging stations. In these cases, one of the stations is designated the 'primary' station for calculation purposes and to maintain proper flow relationships between stations. Only primary stations are connected to the downstream portion of the network. For areas with only one station, the value of Primacy Code must be 1.
 Aliases:
 Value Data Type: Integer
 Value Domain Type: 1 (enumerated)

Value Domain:

Feature Attribute Value:

Label:	Code:	Definition
Non-primary gauge	0	
Primary gauge	1	

4.2.1.24. Relocated-station flag (English attribute data)

Name: Relocated-station Flag (English attribute data)
(RELOCATED_STATION_IND_EN)

Definition: Specifies whether the gauging station has ever been relocated. Value is either 'TRUE' or 'FALSE'.

Aliases:

Value Data Type: Character

Value Domain Type: 0 (not enumerated)

4.2.1.25. Relocated-station flag (French attribute data)

Name: Relocated-station Flag (French attribute data)
(RELOCATED_STATION_IND_FR)

Definition: Specifies whether the gauging station has ever been relocated. Value is either 'VRAI' or 'FAUX'.

Aliases:

Value Data Type: Character

Value Domain Type: 0 (not enumerated)

4.2.1.26. Sub-basin code

Name: Sub-basin Code (SUBBASIN_CODE)

Definition: The Standard Drainage Area Classification (SDAC) 2003 sub-drainage area designation assigned to a gauging station. The 3-character designation is the first three characters in the gauging station's 'number' associated with the SDAC sub-basin. It is used as the name of that sub-basin drainage area. Note: Some stations were 'numbered' with the wrong 3-character designation. These misnumbered stations have been assigned to their correct sub-basin but their station numbers remain unchanged. As well, provincial stations that have a six-digit code (example, 059-012) are assigned to their appropriate proper sub-basin.

Aliases:

Value Data Type: Character

Value Domain Type: 0 (not enumerated)

4.2.1.27. Sub-sub-basin code

Name: Sub-sub-basin Code (SUBSUBBASIN_CODE)

Definition: The Standard Drainage Area Classification (SDAC) 2003 sub-sub-drainage area designation assigned to a gauging station. The 4-character designation is the first four characters in the gauging station's 'number' associated with the SDAC sub-sub-basin. It is used as the name of that sub-sub-basin drainage area. Note: Some stations were 'numbered' with the wrong 4-character designation. These misnumbered stations have been assigned to their correct sub-sub-basin but their station numbers remain unchanged. As well, provincial stations that have a six-digit code (example, 059-012) are assigned to their appropriate proper sub-sub-basin.

Aliases:

Value Data Type: Character

Value Domain Type: 0 (not enumerated)

4.2.1.28. Sum of non-contributing areas of a total gross drainage area (sq. km)

Name: Sum of Non-contributing Areas of a Total Gross Drainage Area (sq. km) (TOTAL_NON_CONTRIB_SQKM_AREA)

Definition: The planar area (in square kilometres) of the portion of the total gross drainage area NOT expected to contribute to an average runoff.

Aliases:

Value Data Type: Rational

Value Domain Type: 0 (not enumerated)

4.2.1.29. Sum of non-contributing areas of an incremental gross drainage area (sq. km)

Name: Sum of Non-contributing Areas of an Incremental Gross Drainage Area (sq. km) (INCR_NON_CONTRIB_SQKM_AREA)

Definition: The planar area (in square kilometres) of the portion of an incremental gross drainage area NOT expected to contribute to an average runoff. An incremental gross drainage area is defined as 'the area of a gauging station's (total) drainage area, less that of the next upstream station(s)'.

Aliases:

Value Data Type: Rational

Value Domain Type: 0 (not enumerated)

4.2.1.30. Total effective drainage area (sq. km)

Name: Total Effective Drainage Area (sq. km) (TOTAL_EFFECTIVE_SQKM_AREA)

Definition: The planar area (in square kilometres) of the portion of the total gross drainage area expected to contribute to an average runoff.

Aliases:

Value Data Type: Rational

Value Domain Type: 0 (not enumerated)

4.2.1.31. Total gross drainage area (sq. km)

Name: Total Gross Drainage Area (sq. km) (TOTAL_GROSS_SQKM_AREA)

Definition: The maximum upstream planar area (in square kilometres) of a gauging station that could contribute surface runoff.

Aliases:

Value Data Type: Rational

Value Domain Type: 0 (not enumerated)

4.2.1.32. Unique station identifier

Name: Unique Station Identifier (UNIQUE_STATION_ID)

Definition: Used to differentiate between historic locations of the same station. It is created by appending a sequential index number to the Station Number, ex. 05AB123_1. The current location has the suffix _1, and the next most recent is designated with _2, and so on.

Aliases:

Value Data Type: Character

Value Domain Type: 0 (not enumerated)

4.2.1.33. Upstream station identifier

Name: Upstream Station Identifier (FROM_STATION_ID)

Definition: Identifies the upstream gauging station of a network segment, using its unique station identifier.

Aliases:

Value Data Type: Character

Value Domain Type: 0 (not enumerated)

5. REFERENCE SYSTEM

5.1. Spatial reference system

Horizontal coordinate reference system: WGS84

Map projection: Web Mercator Auxiliary Sphere; EPSG: 3857; Version 8.1.4

5.2. Temporal reference system

Gregorian calendar

6. DATA QUALITY

6.1. Completeness

Measure not defined at this time.

6.2. Logical consistency

Measure not defined at this time.

6.3. Positional accuracy

Measure not defined at this time.

6.4. Temporal accuracy

Measure not defined at this time.

6.5. Thematic accuracy

Measure not defined at this time.

6.6. Lineage statement

These drainage area datasets have been processed from the current AAFC Watersheds Project's source database of gauging stations (STATIONS) and their associated boundaries (LINEWORK) and network (NETWORK). They include updates (improvements and changes) to stations, station locations and their boundary (re)delineations incorporated since the last publication"AAFC

Watershed Project – 2012”. The automated processes for the output product creation may have been modified as well.

Scope: series

7. DATA CAPTURE

Creation/Updating Procedure

Drainage basin boundaries are created or updated periodically based on requests by stakeholders of the AAFC Watershed Project. The datasets are updated using the best source data available for delineation with the latest version of the Esri software ArcGIS. The current version includes all updates up to December 2013.

Due to the flat topography found in the agricultural regions of the prairie provinces, boundaries developed by automated procedures cannot be used with any degree of confidence. All drainage basin boundaries in the AAFC Watershed Project have been delineated and reviewed manually using ArcGIS in conjunction with remote imagery and local knowledge of the landscape.

Historical Data Capture Procedure

The traditional (manual) process for delineating drainage basins and tabulating their gross and effective areas was very time-consuming and laborious. The gauging stations were marked on a paper topographic mapsheet (usually 1:50,000 scale), and the incremental gross and effective drainage basin boundaries were delineated. The resultant areas were carefully planimeted and validated. An index card was kept for each planimeted mapsheet where components of the gross and effective areas were recorded. The stations and drainage area boundary representations were transferred to 1:250,000 scale mapsheets. The areas from the index cards were ascribed to the respective polygons on the 1:250,000 scale mapsheet. (The use of 1:250,000 mapsheets permitted viewing sixteen 1:50,000 mapsheets at a glance which provided a better overview of the gauging station basins.) Tabulation sheets were set up for each gauging station. The gross and effective drainage area values from the 1:250,000 scale mapsheets were listed on the tabulation sheets and then summed. Since each gross and effective area is part of the drainage area for all downstream gauging stations, it was recorded on each of their respective tabulation sheets as well.

The gross and effective drainage areas for each gauging station were published in Hydrology Report #104 and subsequent addenda (Martin 2001). In addition, gross and effective area boundary representations were traced onto 1:250,000 scale mylars and distributed to interested parties.

Updates, resulting from a change in gauging station location or a change in drainage, required that the gauging station(s) boundaries be redrawn on the paper maps and the entire process redone. The revised values were incorporated into an addendum to the Hydrology Report #104. With the emergence of GIS technology in the early 1990s, it was felt that this labour-intensive manual process could be automated and substantially speeded up by moving the database into the digital environment.

The source products are in an equal-area projection in the North American Datum of 1983 (NAD83). In Version 5, there was a conversion of all the source products from NAD27 to NAD83.

All output products are generated from the three source products - STATIONS, LINEWORK, and NETWORK.

Migration to the GIS Environment

The gross and effective drainage area boundaries were converted (digitized) into digital format for the development of a GIS database to provide a more automated process. Before digitizing commenced, an accounting of all required mapsheets was done. Most of the mapsheets were Canadian 1:50,000 scale National Topographic Survey (NTS) maps, but the project also included some 1:250,000 scale NTS maps, and American United States Geological Survey (USGS) 1:24,000, 1:62,500 and 1:250,000 scale maps. Digital index map coverages (Canadian and American) of the outlines of all project mapsheets were created.

Most Saskatchewan maps were digitized by Saskatchewan Water Corporation personnel using PC ArcInfo. All other maps (from Alberta, Manitoba, British Columbia, Ontario, Northwest Territories,

Nunavut and United States) were digitized by PFRA Hydrology Unit personnel using UNIX ArcInfo 7.x. All subsequent GIS work was done with ArcInfo 7.x and 8.x.

A digitizing RMS error standard was set at 0.003. However, some mapsheets failed the standard because of their poor condition. Digitizing information (consisting of mapsheet number, name, edition, publication year, projection and datum, tic numbers, who digitized the map, date digitized, and RMS error) were recorded in a binder and later transferred to a spreadsheet.

Digitizing was done in each map's native projection. Most were Universal Transverse Mercator (UTM) projections in the North American Datum of 1927 (NAD27). Many others, mostly American, were either Transverse Mercator or Lamberts Polyconic (State Quadrangle maps). Some of the newer maps, or ones that were re-digitized, were NAD83.

To allow all the data to be combined into one large dataset, a single projection was needed. As well, minimal distortion of areas is very important for watershed area calculations. An Albers Conic Equal-Area projection was chosen because it preserves the property of area well in mid-latitude land masses that are predominantly oriented east-west. All datasets were projected into Albers from their digitized projection.

Edge-matching combined all the maps into one seamless dataset. It was an arduous process because arcs of adjacent mapsheets often did not match. This discontinuity was attributable to low relief topography, digitizing being done without the context of the adjacent mapsheet, different scales of adjacent sheets, and the thickness of the hand-drawn lines. Hand-drawn boundaries on the mapsheets range in thickness from 0.5 mm to 1 mm. A line 1 mm in width represents 24 metres on the ground at a scale of 1:24,000; 50 metres at 1:50,000; and 250 metres at 1:250,000. The edge-matching process resulted in a seamless dataset of lines and points requiring quality checks. It was decided that quality checks would best be handled during the creation of data products.

The established manually-generated database provided a very useful reference for both checking the GIS process methodology and validating the network of linkages between gauging stations. Major differences between manually-generated and digitally-generated drainage area values indicated network linkage errors that were subsequently corrected. When all network linkage problems were resolved, discrepancies still remained, albeit rather small ones in most cases. Initially, these small discrepancies were attributed to digitizing inaccuracies and projection distortions in the digital environment. After extensive investigation, some discrepancies were determined to have resulted primarily from planimetry errors in the manual process. These differences between the manually-generated and digitally-generated values of gross and effective drainage areas were quite small, generally much less than 1%.

Post-migration Developments

Two "locations" for the gauging stations were added to the source data: the latitude and longitude coordinates, and the legal land description (where available). The locations provided indicate the point where the water exits the gross drainage basin (the location used to define the drainage basin outlet).

Note: these locations may do not necessarily coincide with the point location for g station in these data products. Our process is: from best sources (air photos or imagery) locate the gauging station. Begin the outlining of the drainage basin from that point on the water feature. Place a gauging station point a minimum convenient distance (10 to 50 metres) upstream of the actual gauging station position. The point must be inside the incremental gross drainage area for the methodology to work.

Datum Conversion of Source Datasets (NAD27 to NAD83)

Source datasets before Version 5 were maintained in an Albers Conic Equal-Area projection in the NAD27 datum to match the original NTS mapsheets from which the delineations were developed. The source datasets were converted to the NAD83 datum for Version 5. The following steps were used:

- 1) Stations, linework and network lines were divided by country, Canada and the United States, using a Canadian/USA border derived from Statistics Canada Census Consolidated Subdivisions 2001 boundaries.
- 2) The American components were converted from NAD27 to NAD83 using the NADCON datum transformation.
- 3) The Canadian components were converted using the NTV2 datum transformation.

4) At the border, American lines were snapped to their corresponding Canadian lines. In most cases, the snapping distance was less than one metre.

5) Breaks introduced at the border were removed from the network dataset, but retained for the boundary lines, to record the location of the border division.

The datum transformation resulted in minor incremental area changes within the watershed basins, the majority being less than one hectare or 3/1000 of a percent of the incremental basin areas.

8. DATA MAINTENANCE

When drainage pattern changes are noted, or when gauging stations are added or relocated, the database is updated. This is done using “head’s-up digitizing” that uses digital NTS maps and/or ortho-rectified images as primary locational reference(s). As an example, digital 1:20,000 NTS maps and orthophotos, where available, were used to update 1:50,000 sourced basin delineations in Manitoba for Version 5. In subsequent versions, better source material such as newer orthophotography, satellite imagery, and higher resolution digital elevation models have allowed for refinements to be made to the current boundaries.

As of 2013, the drainage basin boundaries along the Canada/United States border were made seamless between the two countries through an initiative by the International Joint Commission (IJC). Henceforth all AAFC Watershed Project boundaries crossing into and contained within the United States will be maintained to match those within the USGS Watershed Boundary Dataset.

Once the linework has been edited and reassembled, the various drainage areas are recalculated and the output datasets are reconstructed and published.

In addition, as uses of the data increase, new derived datasets may be identified and developed, example: Total Gross Drainage Areas of the AAFC Watersheds Project.

9. PORTRAYAL

Not applicable.

10. DATA PRODUCT DELIVERY

Delivery medium information:

units of delivery: package
medium name: online via HTTP, online via direct access

Delivery format information:

File Geodatabase
format name: Esri Geodatabase (File-based)
format version: 10.0
specification: A collection of various types of GIS datasets held in a file system folder.
(http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#/Types_of_geodatabases/003n000000700000/)
languages: eng
character set: utf8

GML
format name: Geography Markup Language
format version: 2.0

specification: Open Geospatial Consortium Inc., OpenGIS®Geography Markup Language (GML) Implementation Specification, Version 3.1.1, 2004-02-07, Reference number of this OGC® project document: 03-105r1 (http://portal.opengeospatial.org/files/?artifact_id=4700)

languages: eng

character set: utf8

csv

format name: Comma Delimited

format version: 1.0

specification: A delimited data format that has fields/columns separated by the comma character

languages: eng

character set: utf8

11. METADATA

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