Minnesota Geospatial Advisory Council

Stream ID Standard

DRAFT Version 1.0.8 – For Public Review

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This draft of the standard is made available for public review from 5/1/2022 **through July 31, 2022**

Please send comments and suggestions on changes to this standard to the Standards Committee via email **by July 31, 2022.** Send comments to: gisinfo.mngeo@state.mn.us

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About the GAC

The mission of the Minnesota Geospatial Advisory Council (GAC) is to act as a coordinating body for the Minnesota geospatial community. The GAC is authorized by legislation passed in 2009 and reauthorized in 2014 Minnesota Statutes (16E.30, subd. 8). It represents a cross-section of organizations that include city, county, regional, state, federal and tribal governments as well as education, business, and nonprofit sectors.

As part of this mission, the GAC works with the Minnesota geospatial community to define and adopt standards needed by the community. GAC standards are developed and proposed by geospatial community subject matter experts. The GAC's Standards Committee administers a process to ensure community-wide public review and input for any proposed standards.

The GAC does not mandate or enforce standards. It offers the standards as a resource to the community. Organizations may choose to adopt the standards and require their use internally.

Introduction

This standard provides a common convention and coding scheme for identifying streams in Minnesota. A stream includes any flowing body of water like a river or ditch.

Purpose of this Standard

This standard has been developed to improve the exchange of data about streams. It provides common coding schemes for identifying watercourses (the entirety of a stream) and reaches (a portion of a stream) in Minnesota. The standard is intended to be used when data are being shared.

Applicability

Use of this standard is recommended when organizations exchange data, or when new databases are being designed that require identification codes for streams. Use of this standard is strongly encouraged, but voluntary. This standard applies to data that are being transferred and does not attempt to restrict how those data are internally stored or used. Specific organizations within the state may choose to adopt this standard and require compliance with it.

Sources of this Standard

This standard uses multiple stream identifiers that come from both the state and federal governments.

Federal: This standard is derived from the Geographic Names Information System (GNIS) and from Codes for the Identification of Hydrologic Units in the United States and the Caribbean Outlying Areas, USGS Geological Survey Circular 878-A.

Data Source: National Hydrography Dataset (NHD) GIS data files for the state of Minnesota, which incorporate the reach numbering and naming convention, can be found on the Minnesota Geospatial Commons https://gisdata.mn.gov. Information about this dataset is available at https://www.usgs.gov/national-hydrography/national-hydrography-dataset

State: This standard is derived from the Fisheries Stream Survey Manual, Special Publication No. 165 https://files.dnr.state.mn.us/publications/fisheries/special_reports/165.pdf.

Data Source: The MNDNR Hydrography Dataset can be found on the Minnesota Geospatial Commons https://gisdata.mn.gov. The watercourse data layer is "Streams with Kittle Numbers and Mile Measures".

Compliance Notes

A dataset that complies with this standard will include identifier codes for watercourses or reaches in accordance with the data specifications defined below in this standard.

Inclusion

Inclusion is a term used to explain the requirement for a field to be populated in a dataset to comply with the standard. Three types of inclusion are possible: Mandatory, Conditional, and Optional.

Mandatory

Field must be populated for each record to be fully compliant with the standard. Null values are not allowed. This standard does not include any mandatory elements.

Conditional

Each field must be populated with a non-null value for which a specified condition exists.

Example: The NHD Reach Code field must be populated for datasets that include reach features. It would not be populated for datasets that do not contain reach features.

Optional

Field is not required to be populated.

Standard Requirements

This standard describes two related concepts for identifying streams in Minnesota. It includes state and federal identification practices in a common framework for data sharing and transfer. At the heart of this standard are two concepts:

Watercourse – a named flow path through a drainage network, from the source of a stream to its mouth, which can be composed of multiple reaches.

Reach – a segment of a stream generally defined from confluence to confluence, or by some other distinguishing hydrologic feature.

Watercourse Identifier

Both the state and federal governments have defined methods for creating unique identifiers for watercourses. This standard adopts the state method as mandatory when identifying watercourses and the federal method as encouraged but optional.

State Government Watercourse ID – The Kittle Number

The state government watercourse identifier is the Kittle numbering system, used by the Minnesota Department of Natural Resources (DNR). It is defined in DNR Fisheries Stream Survey Manual, Special Publication No. 165.

The Kittle number is a compound identifier consisting of up to 10 parts, each designating another level of tributary. All kittle numbers begin with a letter prefix indicating the main drainage basin into which they flow:

M = Mississippi River basin
S = St. Lawrence drainage basin (Great Lakes)
H = Hudson Bay drainage basin (Red and Rainy Rivers)
I = Iowa drainage

Within each of these major drainages, watercourses are numbered, with each upstream tributary represented as an additional number, separated by a dash. For example, Minnesota tributaries to the Mississippi River are numbered from the south boundary of the state upstream. The Mississippi itself is designated as M.

Example: **River Name Kittle Code**
Mississippi River M
Minnesota River M-055
Blue Earth River M-055-076
Watonwan River M-055-076-003

Unlike the federal GNIS-ID, the Kittle number includes information about upstream/downstream relationships. With the Mississippi as the primary flowpath, the Minnesota, Blue Earth, and Watonwan Rivers each represent another level of tributary above the Mississippi and are each represented by another tributary-level digit in the Kittle system.

Federal Government Watercourse ID – The GNIS Code

The federal government watercourse identifier is the Geographic Names Information System (GNIS) identifier code. The GNIS ID is an 8-digit numeric code represented as a text string with leading zeros included. Examples:

00659759 Minnesota River
00640946 Carver Creek
00640071 Bevens Creek

Because the GNIS ID is related to names, only named streams have a GNIS ID. Unnamed streams do not have an ID number in the GNIS.

Reach Identifier

Stream reach segments and reach identifiers have been defined nationwide by the U.S. Environmental Protection Agency and the U.S. Geological Survey. These reach designations have been adopted into the National Hydrography Dataset (NHD) as Reach Codes. NHD describes the delineation of a reach as follows: The limit of a reach is a significant piece of surface water, generally defined as a stretch of stream between confluences, lake, or other significant hydrologic feature.

The Reach Code is a unique identifier composed of two parts:

1. A Hydrologic Unit Code derived from Codes for the Identification of Hydrologic Units in the United States and the Caribbean Outlying Areas, USGS Circular 878-A. (For Minnesota users, this hydrologic unit or HUC covers the same area as the DNR Major Watershed).
2. Another 6 digits that are randomly assigned, sequential numbers that are unique within a Hydrologic Cataloging Unit. An example of the reach designation is as follows:

   07040002002490, where 07040002 is the Hydrologic Cataloging Unit Code for the Cannon River watershed in Minnesota, and 002490 is the reach or segment code for a portion of the Straight River. (The Straight River itself has multiple reach codes).

The provision of 6 digits for reach numbering ensures the ability to add new reach numbers to accommodate higher resolution data which will continue to add smaller streams to the system.

Note that this use of the term 'reach' describes an administrative unit based on a set of federal designations in the Reach Identification System. In a more generic sense, a 'reach'; is any segment of river defined for any purpose. Other organizations may define 'reaches' for their own management purposes which are independent of the

federally-designated reach identification. For example, an organization may need to designate a portion of a river as a canoe route, a trout stream, a stream habitat improvement area, a fisheries survey investigation area, or a water quality study area. This reach standard does not override organizations' needs to identify 'reaches' defined to meet their own specific purposes. Linear referencing tools can be used to index these organization-specific river segment definitions to the NHD dataset. This indexing works by referencing the user-defined reaches as percentage measures along the NHD reaches and has the advantage of being scale-independent. This makes possible the easy exchange of data pertaining to these specifically-defined reaches and enables them to be mapped easily.

A Note About Names

Stream IDs and stream names are not equivalent references. Federal, State, and local names are usually in agreement but may differ for a given stream. This stream ID serves as a standardized reference.

The U.S. Geological Survey (USGS) and Board on Geographic Names (BGN) maintain federally approved names in the Geographic Names Information System (GNIS) database. GNIS is a digital compilation of all names that originally appeared on the USGS 7.5-minute quadrangle map series and any subsequent approved additions or corrections.

The process for updates, additions, and corrections to the GNIS begins at the state level. The DNR facilitates the naming process of water features in Minnesota and the DNR Commissioner submits state-approved names to the BGN for inclusion in GNIS.

Data Element Details

1.1 Watercourse ID Kittle Number

Database Name	No database name is specified in this standard. KITTLE_NBR is commonly used		
Data Type	Text	**Inclusion**	Conditional
Width	50	**Domain**	
Examples	M, H-057-002, S-002-017-003-001		
Description	Watercourse Kittle number from the Minnesota DNR Fisheries Stream Survey database. If your dataset contains watercourses, you must populate this element to comply with this standard.		

1.2 Watercourse ID GNIS

Database Name	No database name is specified in this standard. GNIS_ID is commonly used		
Data Type	String	**Inclusion**	Optional
Width	10	**Domain**	
Examples	00653267, 00653696		
Description	The GNIS feature identifier code in 8-character text format with leading zeros.		

1.3 NHD Reach Code

Database Name	No database name is specified in this standard. REACH_CODE is commonly used		
Data Type	String	**Inclusion**	Conditional
Width	14	**Domain**	
Examples	07010101000123, 07020005000761		
Description	Unique ID composed of 8 digit watershed code and six randomly assigned digits as defined by the US EPA in the National Hydrography Dataset. If your dataset contains reaches, you must populate this element to comply with this standard.		