GETTING STARTED WITH WDNR 24K HYDRO GEODATABASE

Last edited: August 2016

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OVERVIEW

WHAT IS A GEODATABASE?

WDNR 24K hydro was historically managed in ESRI ARC INFO coverage format and provided to the user community as shapefiles (hydlarc – lines and hydrshai – polygons). However, ESRI has developed a more robust spatial data storage and management system called "geodatabase" which has become the new standard framework for Arc GIS. Simply put, it is a container for spatial and attribute data which can take advantage of the latest data storage technologies. The geodatabase is a more robust and extendable data model compared to shapefiles and coverages.

The main objective of the conversion of WDNR hydro from coverage to geodatabase was to take our existing hydro data and implement it in geodatabase. It was also important to keep the federal hydrography data model (National Hydrography Database – NHD) in mind during this transition. The NHD is now at 1:24,000 scale nation-wide and is already being managed in a geodatabase. USEPA, USGS, USFS as well as all of our neighboring state environmental agencies are adopting NHD as their framework surface water layer. It was determined that we should strive to be as consistent as possible with the federal model in order to facilitate a future consolidation of the WDNR hydro and federal NHD databases.

HOW IS IT DIFFERENT THAN THE PREVIOUS COVERAGE / SHAPEFILES?

A geodatabase is made up of one or more feature datasets, which contain a collection of related feature classes. Feature classes are a collection of geographic features with the same geometry type, such as a point, edge (line), or area (polygon); the same attributes and the same coordinate system. Figure 1 shows the makeup of the WDNR hydro geodatabase. It currently consists of one feature dataset ⊞ W23324.WD_HYDRO_DATA_24K that contains many feature classes ⊟ ⊡ ▦ and a geometric network ⊕ (used for tracing stream networks). Appendix A provides a diagram of the general feature conversion from coverage to geodatabase.

The geodatabase model allows for specific relationships regarding adjacency, connectivity and data integrity to be defined between feature classes.

⊞ WD_HYDRO_DATA_24K
    ⊟ WaterBody_to_Bank
    ⊟ WD_HYDRO_BANK_LN_24K
    ▦ WD_HYDRO_DATA_24K_Topology
    ⊟ WD_HYDRO_FLOWLINE_LN_24K
    ⊟ WD_HYDRO_FLOWLINE_WBIC_LN_24K
    ⊡ WD_HYDRO_JUNCTION_PT_24K
    ⊟ WD_HYDRO_LINE_LN_24K
    ⊡ WD_HYDRO_POINT_PT_24K
    ▦ WD_HYDRO_WATERBODY_AR_24K
    ▦ WD_HYDRO_WATERBODY_WBIC_AR_24K
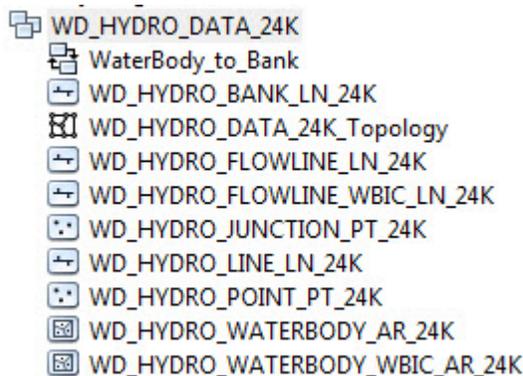
Figure 1. Hydro geodatabase feature dataset in SDE

Metadata for the hydro geodatabase is now available for each hydro feature class in SDE (see Appendix B). In Arc Catalog, select a feature class, then click on the metadata table for details on the purpose of the dataset and the list of attributes that are managed in the feature class.

If you are interested in more details about the hydro geodatabase model, go to \\central\swis\hydro\geodb\documentation to get a printable poster file (hydro_gdb.pdf).

DATABASE SPECS

Projection

Wisconsin Transverse Mercator (WTM), North American Datum 1983/1991 adjustment (NAD91). This will be specified in ArcGIS version 10.0 as NAD 1983 Wisconsin TM (Meters).prj. You may be familiar with the previous naming convention of "NAD_1983_HARN_Transverse_Mercator" – same file, different name. Linear measures are in meters. Area measurements are in square meters.

Precision

The 24K hydro layer is stored in SDE using high precision coordinate accuracy.

Size

The hydro geodatabase is approximately 365MB in size.

ACCESSING THE GEODATABASE
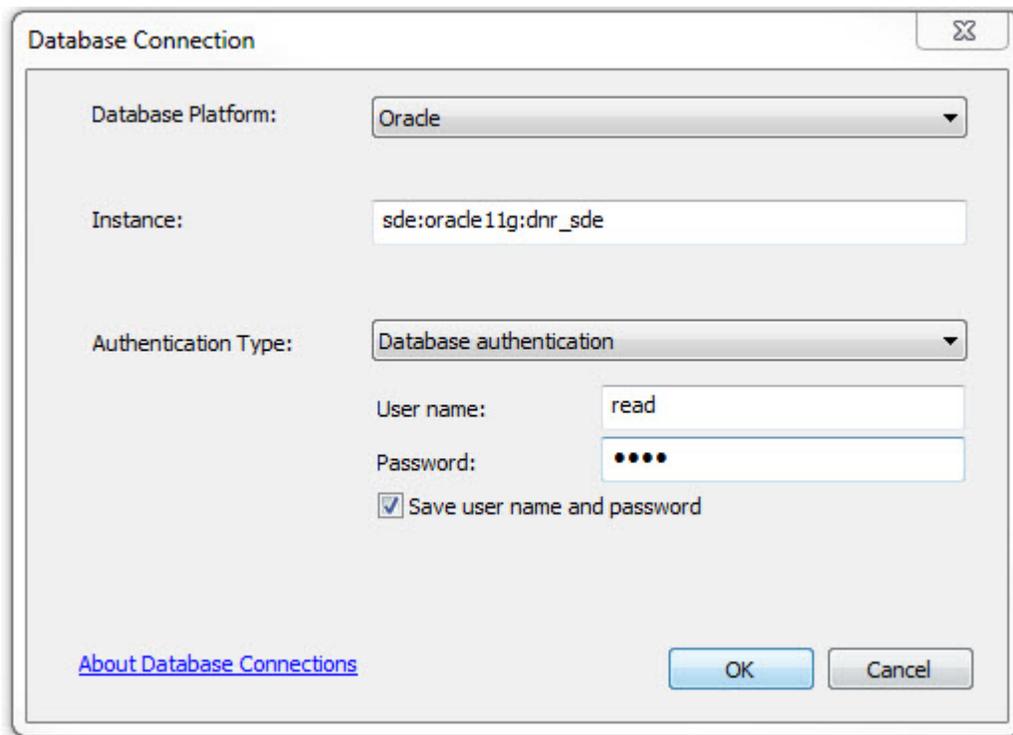
LOCATION OF THE GEODATABASE

For DNR employees, the geodatabase is stored centrally in the SDE data repository in the W23324 schema (directory). This is convenient for staff in the central office but may be somewhat problematic for the field offices due to network traffic issues. To use the geodatabase, it is recommended that field staff extract a local copy of the geodatabase on a regular basis. Instructions on how to properly export the database are provided under the *Exporting the Geodatabase* section at the bottom of page 3. The frequency of the extract will be up to each region based on their interest in keeping up with the edits.

We also keep a copy out on our DNR FTP site for customers outside the department. It includes a file-based geodatabase, documentation and layer files. Location: ftp://dnrftp01.wi.gov/geodata/hydro_24k/

CONNECTING TO THE SDE HYDRO GEODATABASE USING ARCVIEW AND ARCMAP

If you use ARCMAP 10.0 or 10.1 to view the hydro geodatabase, you will need to connect to production SDE using the *Add Spatial Database Connection* utility. The directions for connecting to SDE to view hydro are as follows:
1. From an existing ArcMap session, click the ADD DATA button OR from Arc Catalog,
2. Click on *Database Connections*
3. Double click *Add Spatial Database Connections* and fill in the dialogue box (Figure 2) using either your personal Arc SDE login/password OR the generic User ID of **READ** and password **ONLY** temporarily if you don't have your own Arc SDE personal login/password. This will connect you to production SDE.

Figure 2. SDE connection dialogue window

4. Click OK
5. Scroll down the resulting list to find **W23324.WD_HYDRO_DATA_24K**. Double click the feature dataset to expose all of the feature classes.

EXPORTING THE GEODATABASE

If you want a local copy of the database, you will need to have approximately 365MB of space available. The first step is to create a "container" for the geodatabase and then use ARC Catalog to copy and paste the hydro feature dataset to your intended destination. This will insure that you get the entire contents of the dataset (geometric network, related tables etc.).

1. Open Arc Catalog
2. Right click on the directory in which you would like to export the database
3. Select "New"
4. Select "File Geodatabase" and give the database directory a name
5. Connect to the hydro geodatabase (see instructions above)
6. Right click on the hydro feature dataset **W23324.WD_HYDRO_DATA_24K**
7. Select **"Copy"**
8. Right click on the destination database and select "Paste"
9. The Data Transfer dialogue box (Figure 3) will appear with a list of data types to be copied. Click OK
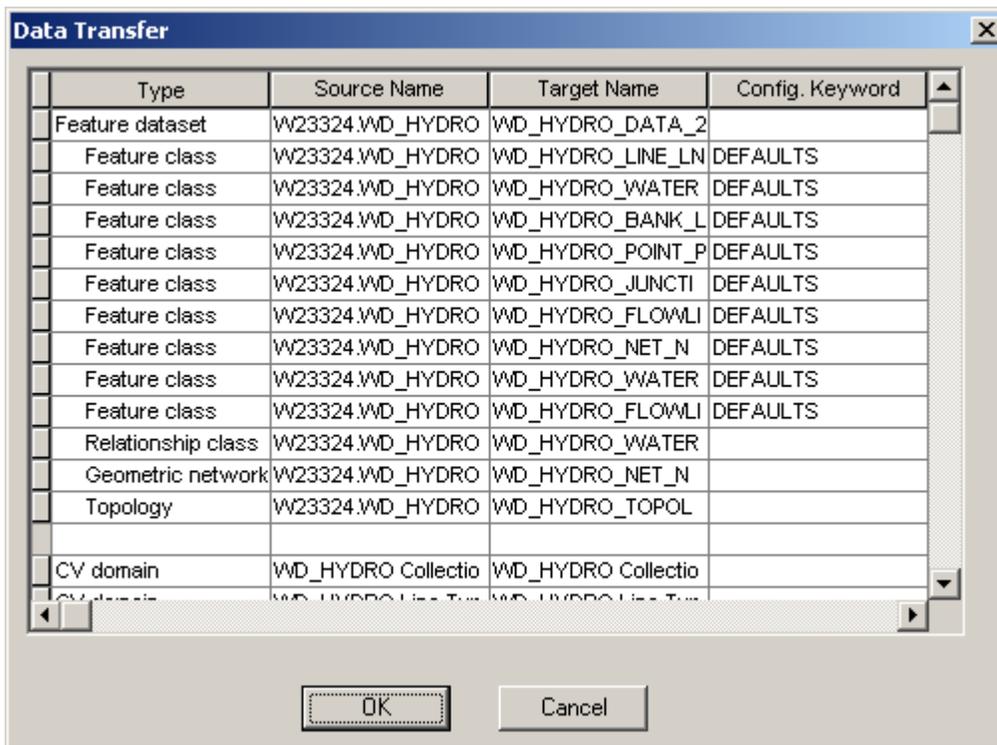
Figure 3. Data transfer dialogue box

USING THE GEODATABASE

The geodatabase behaves somewhat differently than "plain" feature classes. These differences are discussed in the sections that follow.

LOADING THE DATA INTO ARCVIEW / ARCMAP

The attribute domains from the coverage/shapefiles have been converted from text codes (e.g. LP, RF) to numeric codes and descriptions known as subtypes. Subtypes categorize attribute values within a single field in any geodatabase feature class or table. In ArcMap, these subtypes are automatically recognized and displayed by default when you load the data. For example:

- Arc LTYPE codes have been divided into two geodatabase feature classes:

    W23324.WD_HYDRO_FLOWLINE_LN_24K: The new item HYDROTYPE contains old cover ltypes of ST, DC, CB, CL, EX, FP and WG (types that carry flow) as text descriptions. NOTE: You will not see the code numbers in the attribute table of the feature class!

LTYP	Code	Description
CB	502	Cranberry Bog
CL	503	Stream/River Centerline
WG	504	Wetland Gap Connector
DC	505	Ditch/Canal
EX	506	Stream Extension
FP	507	Flow Potential
ST	508	Stream/River, single line

4

W23324.WD_HYDRO_LINE_LN_24K: The new item HYDROTYPE contains old cover ltypes OC, CW, FH (cartographic line features) as text descriptions. NOTE: You will not see the code numbers in the attribute table of the feature class.

LTYP	Code	Description
CW	401	Channel in Water Course
OC	402	Original Channel
UN	403	Unknown

- Shaid SHAID_TYP codes have been moved to the W23324.WD_HYDRO_WATERBODY_AR_24K feature class. The new item HYDROTYPE contains the text descriptions of the features. NOTE: You will not see the code numbers in the attribute table of the feature class.

LTYP	Code	Description
BA	701	Backwater
CB	610	Cranberry Bog
DC	601	Ditch/Canal
FH	702	Fish Hatchery
FE	703	Flooded excavation
IA	704	Inundation Area
IW	705	Industrial Waste Pond
LP	706	Lake/Pond
RF	707	Reservoir/Flowage
ST	602	Stream/River
SD	708	Sewage Disposal Pond
TP	709	Tailings Pond
<None>	710	Unspecified Open Water

When you add a hydro feature class to your ArcMap session, you will get a legend that is symbolized based on the default subtype which is HYDROCODE (see Figure 4). You can choose to apply one of the standard.lyr files to change the symbology or create your own .lyr file to meet your specific needs. See the next section for discussion of .lyr files.
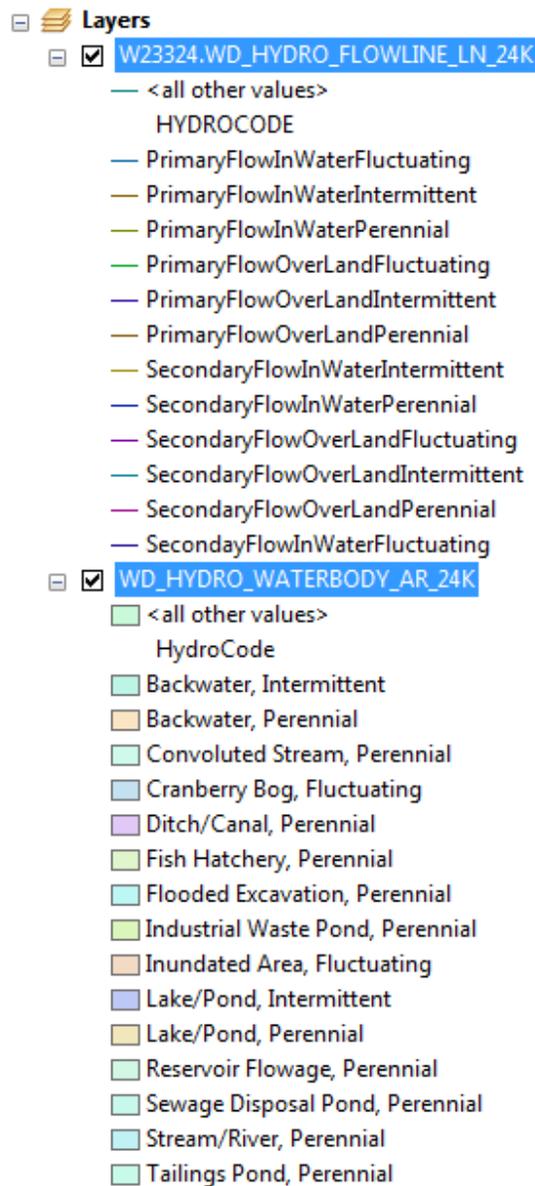
Figure 4. Default symbology for open water and flowlines

CARTOGRAPHY

<u>Layer Files</u>

Using the geodatabase as a cartographic tool will require some change in the way attributes are used to symbolize water features. Standard layer files have been created to help you with symbolizing features for a basic backdrop map based on the new geodatabase model. After copying them to your machine, just drag and drop them into your Arc Map document.

W23324.WD_HYDRO_BANK_LN_24K_CARTO.LYR – Displays shorelines /banks
W23324.WD_HYDRO_FLOWLINE_LN_24K_STREAMS.LYR – Displays streams as blue lines
W23324.WD_HYDRO_FLOWLINE_LN_24K_DURATION.LYR – Displays streams symbolized as perennial (single line), intermittent (dashed line), and fluctuating (dotted line).
W23324.WD_HYDRO_WATERBODY_AR_24K_OPEN_WATER.LYR – Open water (blue polys)

In the coverage/shapefile model, flow (primary vs secondary) and duration (perennial, intermittent) were managed in separate fields. In the geodatabase, these two fields have been combined into the HYDROCODE item for QA/QC purposes. Hydrocode subtypes in the flowline feature class are as follows:

> 100 - Primary Flow Over Land Perennial
> 101 - Secondary Flow Over Land Perennial
> 110 - Primary Flow Over Land Intermittent
> 111 - Secondary Flow Over Land Intermittent
> 120 - Primary Flow Over Land Fluctuating
> 121 - Secondary Flow Over Land Fluctuating
> 200 - Primary Flow In Water Perennial
> 201 - Secondary Flow In Water Perennial
> 210 - Primary Flow In Water Intermittent
> 211 - Secondary Flow In Water Intermittent
> 220 - Primary Flow In Water Fluctuating
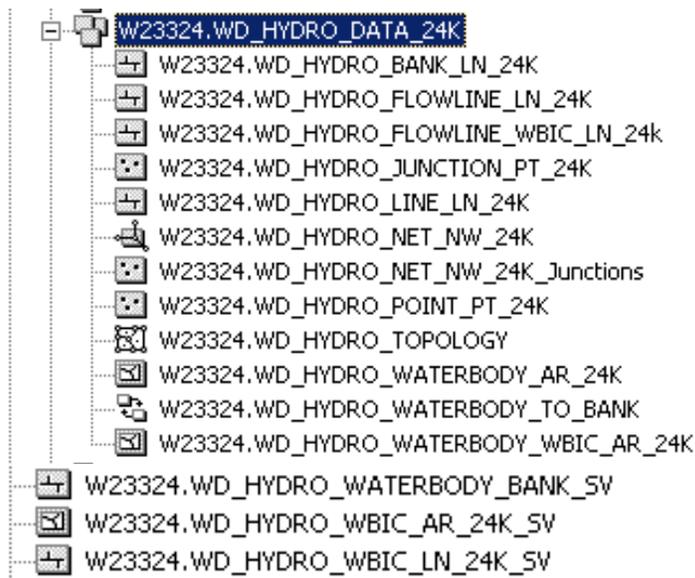> 221 - Secondary Flow In Water Fluctuating

To symbolize streams as perennial or intermittent, you can either a) import the duration layer file or
b) set the symbology of the flowline feature class as follows:

1. Right click on the flowline feature class in the legend
2. Select "Properties"
3. Click the Symbology tab
4. Click "Categories" in the Show: window on the left
5. Click "Unique Values" Under "Categories"
6. Click HYDROCODE in the Value Field box
7. Group all of the "perennial" records together by holding the <ctrl> key down while you click all the entries with the word perennial in it. (NOTE: Primary vs secondary flow will not be differentiated in this exercise.)
8. Click the right mouse button on one of the selected records and select "Group Values" to consolidate all the perennial records into one.
9. Group all of the "intermittent" records together by holding the <ctrl> key down while you click all the entries with the word "intermittent" in it.
10. Click the right mouse button on one of the selected records and select "Group Values" to consolidate all the intermittent records into one.
11. Group all of the "fluctuating" records together by holding the <ctrl> key down while you click all the entries with the word "fluctuating" in it.
12. Click the right mouse button on one of the selected records and select "Group Values" to consolidate all the fluctuating records into one.
13. Click on the symbol for each group to change the symbol and its color.

Use this same grouping method if you want to group all primary flow records together and all secondary flow records together to symbolize them differently.

Spatial Views

There are several spatial views in the hydro SDE schema (W23324) that you have access to. These can be loaded into your mxd as a feature class that has additional attribution. Note: The spatial views are located "outside" of the hydro dataset.

```
├─ ⊟ 🗗 W23324.WD_HYDRO_DATA_24K
│     ├─ ⊞ W23324.WD_HYDRO_BANK_LN_24K
│     ├─ ⊞ W23324.WD_HYDRO_FLOWLINE_LN_24K
│     ├─ ⊞ W23324.WD_HYDRO_FLOWLINE_WBIC_LN_24k
│     ├─ ⊡ W23324.WD_HYDRO_JUNCTION_PT_24K
│     ├─ ⊞ W23324.WD_HYDRO_LINE_LN_24K
│     ├─ ⊿ W23324.WD_HYDRO_NET_NW_24K
│     ├─ ⊡ W23324.WD_HYDRO_NET_NW_24K_Junctions
│     ├─ ⊡ W23324.WD_HYDRO_POINT_PT_24K
│     ├─ ▩ W23324.WD_HYDRO_TOPOLOGY
│     ├─ ▧ W23324.WD_HYDRO_WATERBODY_AR_24K
│     ├─ ⧉ W23324.WD_HYDRO_WATERBODY_TO_BANK
│     └─ ▧ W23324.WD_HYDRO_WATERBODY_WBIC_AR_24K
├─ ⊞ W23324.WD_HYDRO_WATERBODY_BANK_SV
├─ ▧ W23324.WD_HYDRO_WBIC_AR_24K_SV
└─ ⊞ W23324.WD_HYDRO_WBIC_LN_24K_SV
```

W23324.WD_HYDRO_WATERBODY_BANK_SV: contains the water body ID cod (WBIC) of the water body the shoreline is associated with. Load this spatial view into your mxd if you want to be able to click on a shoreline/bank and get the WBIC returned.

Attributes:

Field Name
SHAPE
OBJECTID
RIVER_SYS_WBIC
SHAID_NO
WATERBODY_NAME
WATERBODY_WBIC
SHAPE.LEN

W23324.WD_HYDRO_WBIC_AR_24K_SV: Provides location information from the Register of Waterbodies (ROW) application for hydro areas.

Attributes:

Field Name
OBJECTID
SHAPE
WATERBODY_ID_CODE
WBIC_TYPE_CODE
ROW_OFFICIAL_NAME
RIVER_SYSTEM_WBIC
RIVER_SYSTEM_NAME
AT_MOUTH_PLSS_TWN_ID
AT_MOUTH_PLSS_RNG_ID
AT_MOUTH_PLSS_RNG_DIR_CODE
AT_MOUTH_PLSS_SCTN_ID
AT_MOUTH_PLSS_Q1_SCTN_CODE
AT_MOUTH_PLSS_Q2_SCTN_CODE
AT_MOUTH_COUNTY_NAME
SHAPE.AREA
SHAPE.LEN

W23324.WD_HYDRO_WBIC_LN_24K_SV: Aggregates arcs with the same WBIC into one, single feature (stream) and provides the PLS description of the mouth. PLS description is obtained from the Register of Waterbodies (ROW) application.

Attributes:

| Field Name |
| --- |
| OBJECTID |
| SHAPE |
| WATERBODY_ID_CODE |
| WBIC_TYPE_CODE |
| ROW_OFFICIAL_NAME |
| AT_MOUTH_PLSS_TWN_ID |
| AT_MOUTH_PLSS_RNG_ID |
| AT_MOUTH_PLSS_RNG_DIR_CODE |
| AT_MOUTH_PLSS_SCTN_ID |
| AT_MOUTH_PLSS_Q1_SCTN_CODE |
| AT_MOUTH_PLSS_Q2_SCTN_CODE |
| AT_MOUTH_COUNTY_NAME |
| SHAPE.LEN |

TRACING

Geometric Network

A geometric network consists of a set of connected edges (lines) and junctions (points) that along with connectivity rules are used to represent and model the behavior of a common network infrastructure such as electrical lines, gas pipelines, and water flow in a stream. Geometric networks are typically used to model directed flow systems and can support functions like tracing stream networks. The hydro geometric network is made up of edges from the flowline feature class and junctions.

Utility Network Analyst tool bar

You can use the *Utility Network Analyst* tool in ArcMap with the hydro geometric network to perform stream traces such as find all the tributaries upstream/downstream of where you place a point, find the shortest path between two points, find the accumulation of a specific attribute value upstream of a point etc. Trace results can be generated as a simple graphic or as selected features which can be saved to a feature class/shapefile. In order to conduct a stream trace, make sure you have the geometric network added to your ArcMap session by selecting the **W23324.WD_HYDRO_NET_NW_24K** feature class (see Figure 6). You will notice that the **W23324.WD_HYDRO_NET_NW_24K_JUNCTIONS, W23324.WD_HYDRO_JUNCTION_PT_24K** and the **W23324.WD_HYDRO_FLOWLINE_LN_24K** feature classes get loaded by default. These feature classes make up the geometric network.
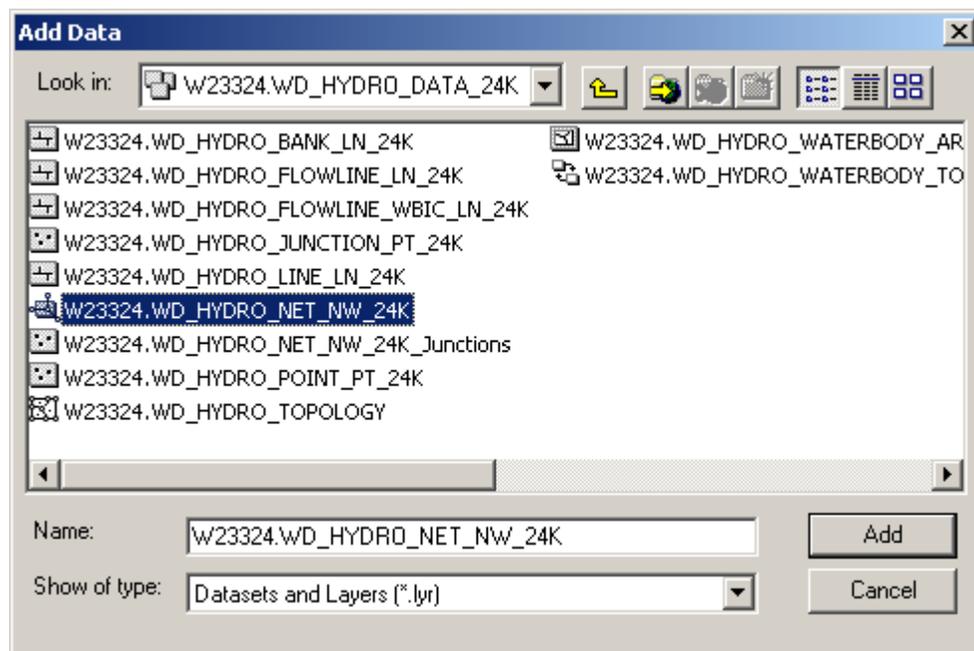
Figure 6. Location of the geometric network

To add the *Utility Network Analyst* tool to your ArcMap session:

1.) Go to the *View* menu and select "Toolbars"
2.) Scroll down the toolbar list and check "Utility Network Analyst". The toolbar in Figure 7 should appear in your mxd:
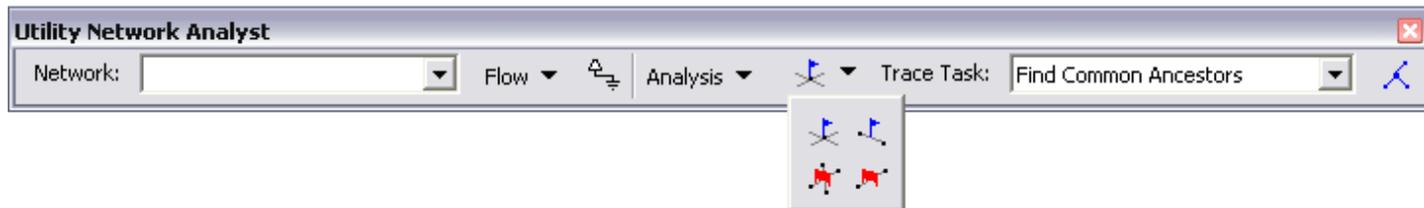
Figure 7. Utility Network Analyst tool bar

The Utility Network Analyst toolbar is divided into two sections. The left side of the toolbar lets you choose a network with which to work and to set and display its flow direction. The right side of the toolbar lets you set up and perform trace operations on the current network.

Network dropdown list
The Network drop-down list contains all of the geometric networks that are currently loaded in ArcMap.

Flow menu
The Flow menu contains items for displaying the flow direction of the features in the network. Clicking the Flow menu reveals three items: Display Arrows, Display Arrows For, and Properties. These commands allow you to see the flow direction of each edge (line).

Clicking Display Arrows For produces a list of the edge feature classes in your network. By checking items in this list, you can specify for which layers to display flow direction. The Display Arrows command is a toggle button that turns on or off the display of flow direction arrows for your network. Clicking the Properties command opens the Flow Display Properties dialog box. The Arrow Symbol tab lets you specify the symbol, size, and color of the arrows used to indicate flow direction. The Scale tab lets you specify the scale range in which the arrows are displayed.

Set Flow Direction button

The Set Flow Direction button establishes flow direction in the network. This button is enabled when the network contains feature classes that are designated as containing persistent sources and sinks.

Analysis menu
The Analysis menu contains commands for setting up the network to perform trace operations. Clicking the Analysis menu reveals five commands: Disable Layers, Clear Flags, Clear Results, Clear Barriers, and Options.

Clicking **Disable Layers** displays a list of feature classes contained in the geometric network. By checking feature classes in this list, you can disable feature classes in trace operations making trace operations behave as if all of the features in those feature classes are disabled. The Clear Flags and Clear Barriers menu items remove flags and barriers, respectively, from the network. Clicking Clear Results clears the results of the previous trace operation.

Clicking **Options** opens the Analysis Options dialog box allowing you to specify options for subsequent trace operations.

The **General tab** of the Analysis Options dialog box lets you specify on which features trace tasks are performed. You can perform trace tasks on all of the features in the network, only the selected features, or only the unselected features. You can specify whether or not trace tasks that consider flow direction include edges with indeterminate or unspecified flow direction. You can also use this tab to specify the snapping tolerance for placing flags and barriers on the map.

The **Weights tab** lets you specify which network weights are used when tracing. For example, set the edge weight to LENGTH to find the shortest path between two points.

The **Weight Filter tab** lets you specify which network features can be traced based on weights assigned to the network features. For both edges and junctions, you can specify valid ranges of weights for features that may be traced.

With the **Results tab**, you can determine in which format you want to receive the results of trace operations. Results can be given as drawings overlaid on the map or as a set of selected features. If you choose to draw the results, you can render only the parts of complex edges that are actually traced, rather than the entire complex feature. You can also specify whether the results will include features that are traced during the operation or features stopping the trace. Finally, you can specify whether the results include both edge and junction features.

Trace Task dropdown list
The Trace Task drop-down list contains a list of all of the trace operations that you can perform using the Utility Network Analyst toolbar. ArcGIS comes with nine built-in trace operations. Some of the most commonly used operate as follows:

> Find Path: Find a path between two points in a network. By default, the Find Path trace task does not use weights. If you do not use weights, the path found is the shortest path based on the *number of line elements in the path*. To find the shortest LENGTH path, add a weight of "length". When you use the Find Path trace task, the flags you place on the network must be either all edge flags or all junction flags. You cannot find a path among a mixture of edge and junction flags.

> Trace Upstream/Downstream: Finds all network elements that lie upstream/downstream of a given point in a network.

> Find Upstream Accumulation: Finds the total cost of all network elements that lie upstream of a given point in a network. By default, the Find Upstream Accumulation trace task does not use weights. If you do not use weights, the cost reported is the number of edge elements in the result.

> Find Connected: All of the features that are connected to a given point through a network.

Find Disconnected: All of the features that are not connected to a given point through a network.

Find Loops: Find loops that can result in multiple paths between points in a network.

Solve button

While the Trace Task drop-down list is used to select the trace task, the Solve button is used to perform the trace operation once you have finished configuring your trace operation using the toolbar. The Solve button performs the trace operation that you selected in the Trace Task drop-down list by using the parameters that you specified using the Analysis Options dialog box and the placement of flags and barriers on the network.

Appendix E provides sample instructions for performing two types of trace queries:
      a.) find all tributaries upstream of the point you click
      b.) find shortest path between two points

APPENDIX A - GEODATABASE METADATA LINKS

W23324.WD_HYDRO_BANK_LN_24K

W23324.WD_HYDRO_FLOWLINE_LN_24K

W23324.WD_HYDRO_FLOWLINE_WBIC_LN_24K

W23324.WD_HYDRO_JUNCTION_PT_24K

W23324.WD_HYDRO_LINE_24K

W23324.WD_HYDRO_POINT_PT_24K

W23324.WD_HYDRO_WATERBODY_AR_24K

W23324.WD_HYDRO_WATERBODY_WBIC_AR_24K

APPENDIX B - REQUESTING AN ArcSDE PERSONAL USER ACCOUNT

DNR's standard process to obtain an Oracle "User ID" is used to request an ArcSDE/Oracle personal or generic user account. The basic steps are summarized below. See DNR's *ITWorks* website for more specific information: http://intranet.dnr.state.wi.us/scripts/int/at/et/helpdesk/9600-61.asp.

1. Email your ITC/RIM the following information along with a brief request indicating you want to apply for an ArcSDE personal user account:

   ➢ your name and office phone number

   ➢ your current Oracle User ID (i.e., if you already have a personal user account and are adding ArcSDE/Oracle access to it)

   ➢ ArcSDE/Oracle instance(s) to which the personal or generic user account needs access

   > ***DNR_GEOTEST*** = development instance on server *APWMAD1D0214*
   > ***DNR_UA_SDE =*** user acceptance test instance on server *APWMAD1A0226*
   > ***DNR_SDE*** = production instance on server *APWMAD1P0236*

   ➢ data privileges (i.e., SELECT, INSERT, UPDATE, DELETE) for the user account.

2. ITC completes and submits a *User ID Maintenance Request Form*. You are notified by email of your new ArcSDE/Oracle user account name and password.

3. Notify the ArcSDE Administrator after you logon to an ArcSDE/Oracle instance with your new personal or generic user account for the first time. This ensures that various ArcSDE/Oracle database parameters and permissions are set correctly.

4. Contact the ArcSDE Administrator if you need help.

APPENDIX C - SAMPLE TRACING INSTRUCTIONS

TRACE QUERY 1: FIND ALL TRIBUTARITES TO THE CLASS I TROUT STREAM PORTION OF BROWN CREEK IN BARRON COUNTY

1.) Add the hydro geometric network to your ArcMap session
2.) Add the trout classification line layer to your ArcMap session
    a.) Connect to production SDE and select W23321.WT_TROUT_WATER_LN_24K_SV
    b.) Symbolize on the TROUT_CLASS_CODE field to uniquely identify each trout class (Class I, Class II, Class III)
3.) Add the Utility Network Analysis Bar to your ArcMap session
    a.) Go to the *View* menu and select "Toolbars"
    b.) Scroll down the toolbar list and check "Utility Network Analyst"
4.) Go to the Flow menu and click *Display Arrows* (this will draw arrowheads on the flowlines to indicate flow direction)
5.) Go to the Analysis menu, select "Options" then click the *Results* tab (see Figure 8)
    a.) Under the "Results format" section, click the selection radio button.
    b.) Uncheck the Junctions radio button in the "Results content" section so you don't see the junctions returned in the results.
    c.) Click OK
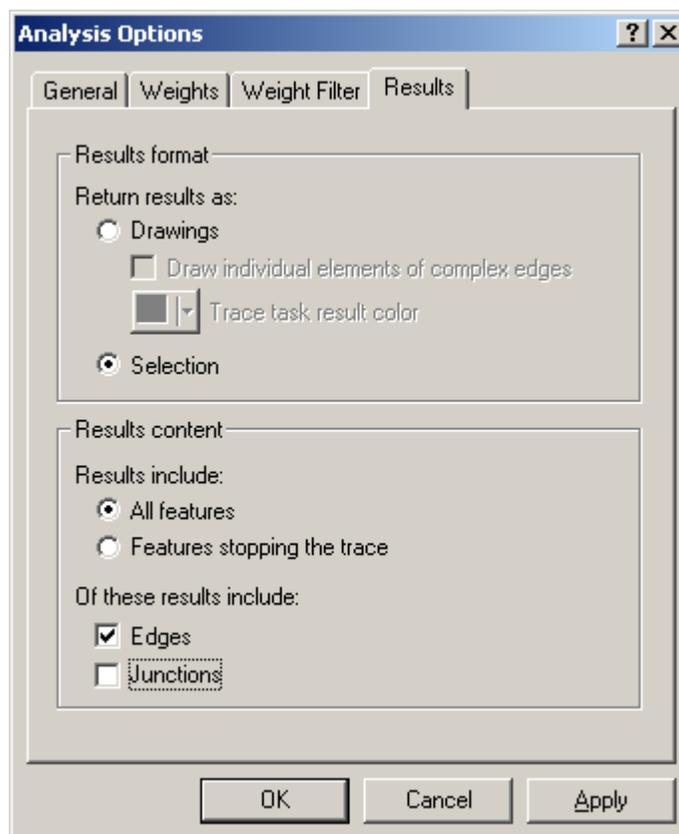
Figure 8. Analysis Options dialog box Results settings

6.) Zoom to Brown Creek in Barron County (Flowline feature class RIVER_SYS_WBIC 2095800)
7.) Turn on trout classification layer to identify Class I portion of the stream (see Figure 9 – green segment)

Click the *Add Edge Flag* tool

9.) Place your cursor at the furthest downstream start point of the class I trout section and click to place the edge flag (see Figure 9). **NOTE**: It is best to zoom in closely (e.g. 1:5000) to make sure you get your flag setting on the proper line).
10.) Select "Trace Upstream" from the Trace Task dropdown menu.

11.) Click the Solve button to initiate the trace.

12.) The results should be selected and highlighted (see Figure 10).
13.) Save the selected records to a shapefile. The WBIC and name of Brown Creek and its tribs will be available in the attribute table of the shapefile (see Figure 11).
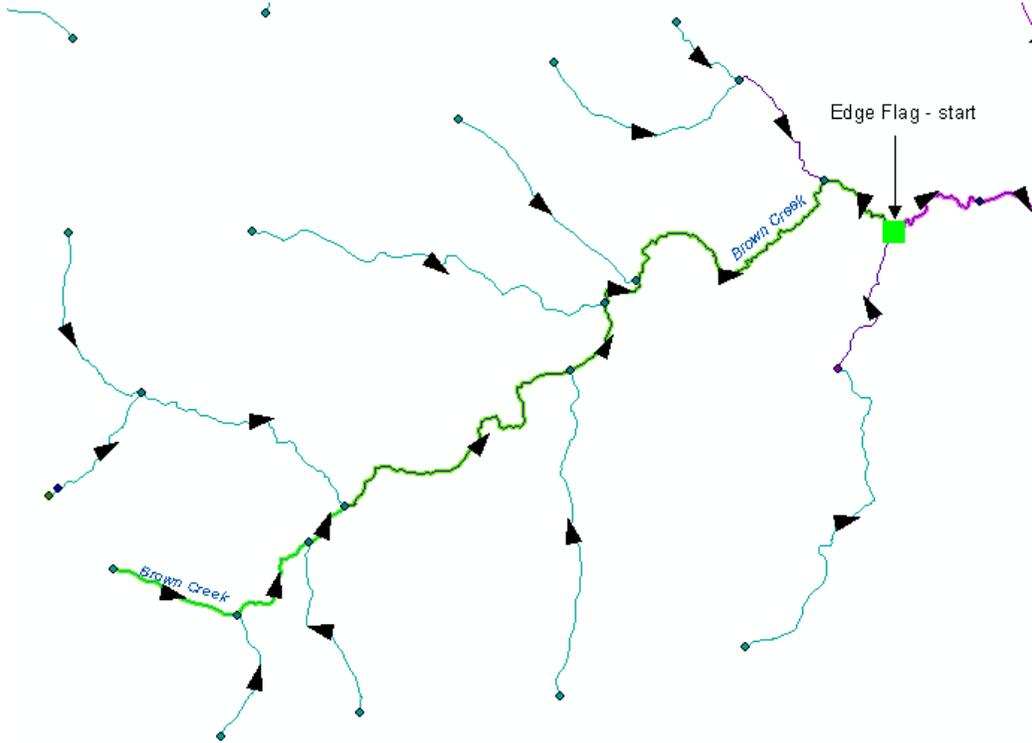
Figure 9. Class I trout stream portion (green) of Brown Creek and edge flag location for start point of trace.
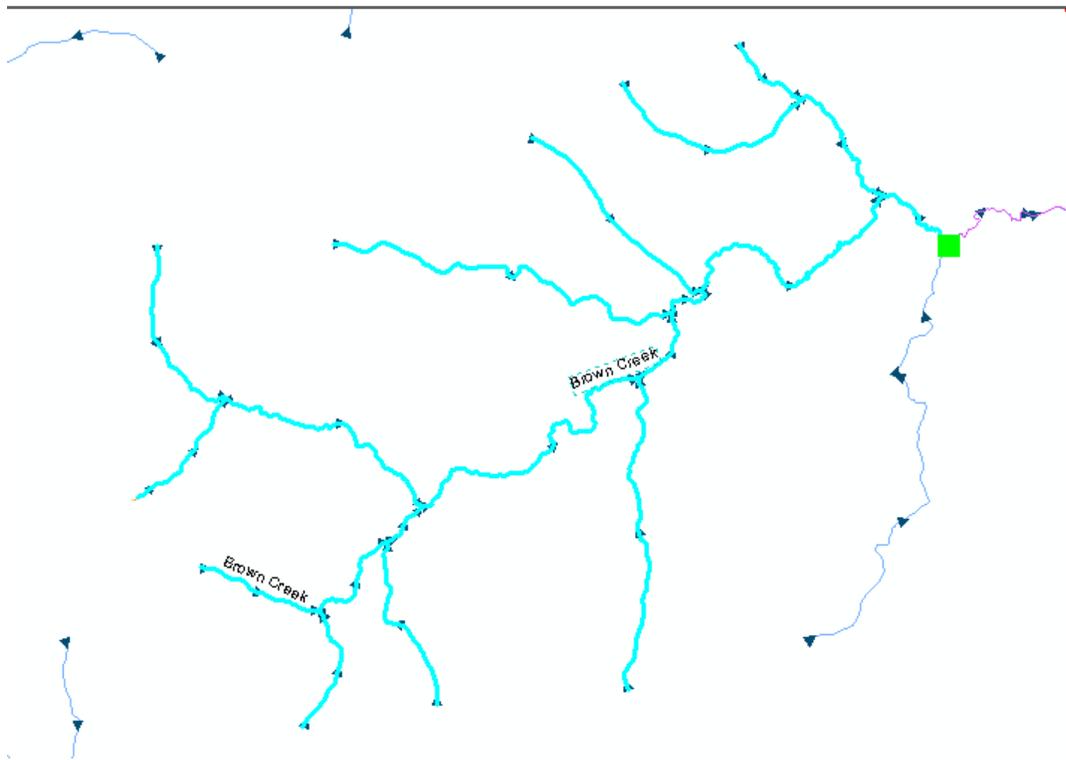
Figure 10. Trace upstream results

Figure 11. Trace results attribute table.

TRACE QUERY 2: FIND THE SHORTEST PATH BETWEEN TWO POINTS (From Black River – The Bullet Chute up to Hwy 35)

1.) Add the hydro geometric network to your ArcMap session
2.) Add the roads to your ArcMap session (K:\dvgislib\wi_tile\basehd_2\rdwlw924\rdwlarc.shp)
3.) Add the Utility Network Analysis Bar to your ArcMap session
      a. Go to the *View* menu and select "Toolbars"
      b. Scroll down the toolbar list and check "Utility Network Analyst"
4.) Go to the Flow menu and click *Display Arrows* (this will draw arrowheads to indicate flow direction)
5.) Trace results are by default returned as a drawing/graphic. If you want the results to be returned as a selection of arcs, go to the Analysis menu, select "Options" then click the *Results* tab.
      a. Under the "Results format" section, click the selection radio button.
      b. Uncheck the Junctions radio button in the "Results content" section so you don't see the junctions returned in the results.
   c. Click OK
6.) To find the shortest path in terms of total LENGTH, go to the Analysis Menu, select "Options" and click the weights tab (see Figure 12). NOTE: If you don't weight the trace with length, the resulting path will be the shortest path based on the *number of line elements.*
      a. Under *Edge Weights*, go to the first drop down menu (Weight along digitized direction of edges (from-to weight) and select "Length"
      b. Click OK
7.) Zoom to The Bullet Chute of the Black River by querying the flowline feature class for RIVER_SYS_NAME = 'The Bullet Chute'.

8.) Click the *Add Edge Flag* tool
9.) Place the flag just above the intersection of The Bullet Chute with the Mississippi River (see Figure 13).
10.) Pan upstream along the Black River until you get to highway 35.
11.) Click on the river at highway 35 to place the second edge flag (see Figure 13)
12.) In the Trace task dropdown menu, select "Find Path".

Figure 12. Analysis Options /Weights dialog box

14.) Click the Solve button [icon] to initiate the trace.

15.) The results should be selected and highlighted (see Figure 13).
   NOTE: If you don't see any results returned, check your "Set Selectable Layers" list and make sure you have the flowline feature class selected.

16.) Export the arcs to a shapefile to save the path if you wish.

17.) To get the total length:
   a.) Open the attribute table of the flowline feature class (or your saved shapefile)
   b.) Show only the selected records (click "selected" at bottom)
      c.) Right click on the shape.len field, then select "Statistics". The statistics for the field are reported back as in Figure 14. The **SUM** attribute is reported in meters.

   NOTE: The trace function only works on entire arcs, NOT portions of arcs. This means that if your flag falls at a midpoint of an arc, then the resulting trace will continue past your flag to the end of that arc. This will add some length to your result.
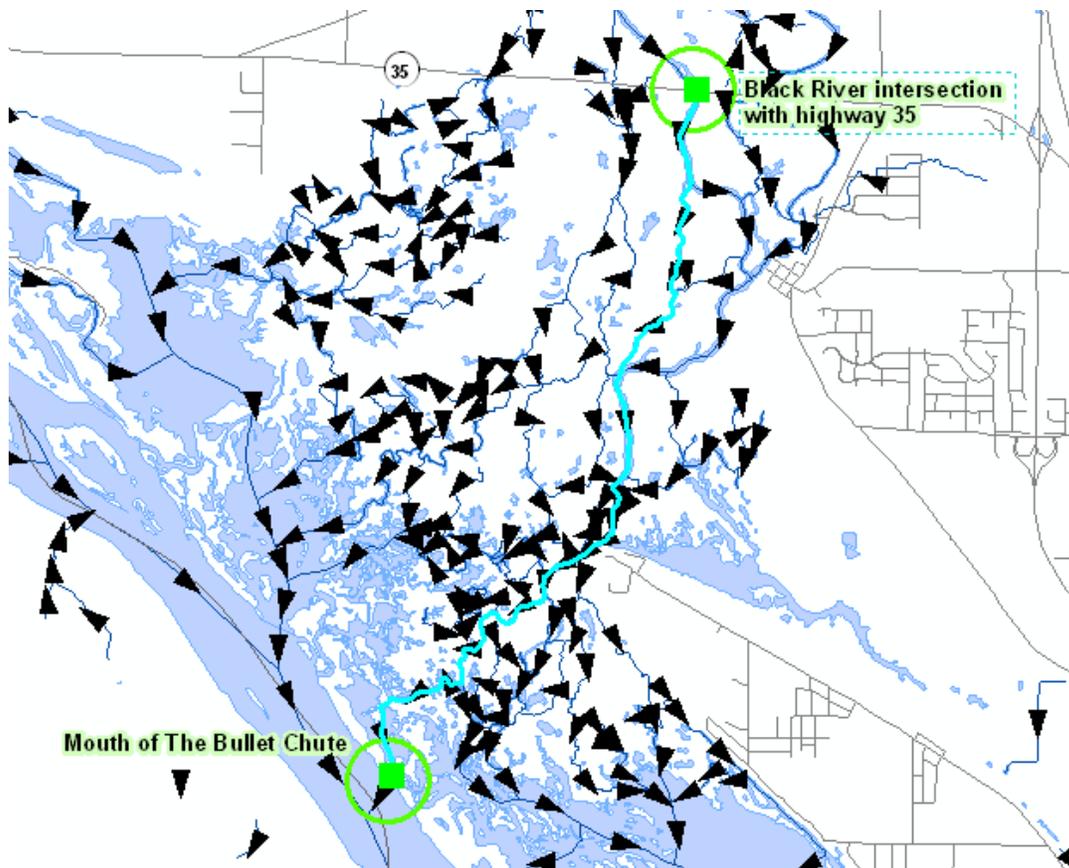
Figure 13. Find shortest path trace results
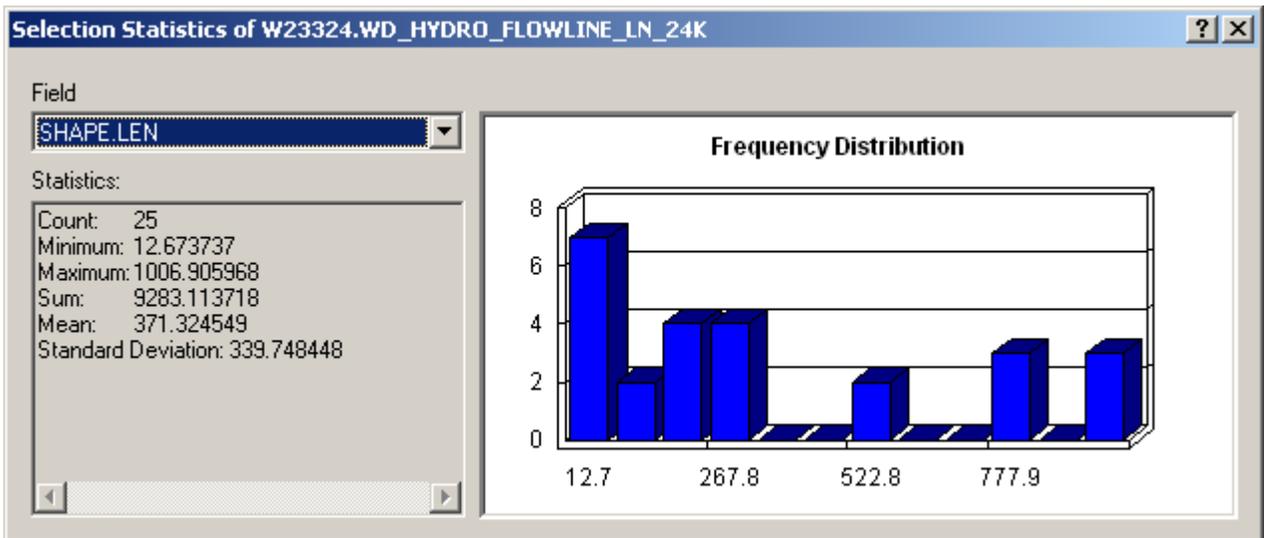
Figure 14. Statistics output on the resulting trace length.

connectivity rule

1. In geometric networks, a rule that constrains the type and number of network features that can be connected to one another. There are two types of connectivity rules: edge-edge and edge-junction.
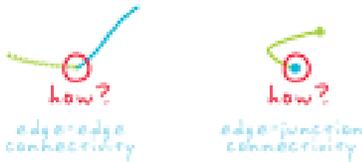
edge

1. A line between two points that forms a boundary. In a geometric shape, an edge forms the boundary between two faces. In an image, edges separate areas of different tones or colors. In topology, an edge defines lines or polygon boundaries.
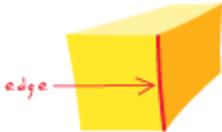
2. In a network system, a line feature through which a substance, resource, or traffic flows. Examples include a street in a transportation network and a pipeline in a sewer system. In a geometric network, a network edge can be simple or complex. A simple edge is always connected to exactly two junction features, one at each end. A complex edge is always connected to at least two junction features at its endpoints, but it can also be connected to additional junction features along its length. In a network dataset, a network edge is only connected to two junctions at its endpoints.

feature class

1. In ArcGIS, a collection of geographic features with the same geometry type (such as point, line, or polygon), the same attributes, and the same spatial reference. Feature classes can be stored in geodatabases, shapefiles, coverages, or other data formats. Feature classes allow homogeneous features to be grouped into a single unit for data storage purposes. For example, highways, primary roads, and secondary roads can be grouped into a line feature class named "roads." In a geodatabase, feature classes can also store annotation and dimensions.

feature dataset

1. In ArcGIS, a collection of feature classes stored together that share the same spatial reference; that is, they share a coordinate system, and their features fall within a common geographic area. Feature classes with different geometry types may be stored in a feature dataset.

geodatabase

1. A database or file structure used primarily to store, query, and manipulate spatial data. Geodatabases store geometry, a spatial reference system, attributes, and behavioral rules for data. Various types of geographic datasets can be collected within a geodatabase, including feature classes, attribute tables, raster datasets, network datasets, topologies, and many others. Geodatabases can be stored in IBM DB2, IBM Informix, Oracle, Microsoft Access, Microsoft SQL Server, and PostgreSQL relational database management systems, or in a system of files, such as a file geodatabase.

geometric network

1. Edge and junction features that represent a linear network, such as a utility or hydrologic system, in which the connectivity of features is based on their geometric coincidence. A geometric network does not contain information about the connectivity of features; this information is stored within a logical network. Geometric networks are typically used to model directed flow systems.
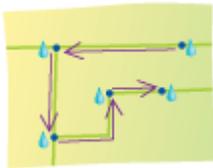
junction

1. For network data models in a geodatabase, a point at which two or more edges meet.

relationship class

1. An item in the geodatabase that stores information about a relationship. A relationship is an association or link between two objects in a database. Relationships can exist between spatial objects (features), between non-spatial objects (rows in a table), or between spatial and nonspatial objects.

schema

1. In a relational database, the schema defines the tables, the fields in each table, the relationships between fields and tables, and the grouping of objects within the database. Schemas are generally documented in a data dictionary. A database schema provides a logical classification of database objects.

subtype

1. In geodatabases, a subset of features in a feature class or objects in a table that share the same attributes. For example, the streets in a streets feature class could be categorized into three subtypes: local streets, collector streets, and arterial streets. Creating subtypes can be more efficient than creating many feature classes or tables in a geodatabase. For example, a geodatabase with a dozen feature classes that have subtypes will perform better than a geodatabase with a hundred feature classes. Subtypes also make editing data faster and more accurate because default attribute values and domains can be set up. For example, a local street subtype could be created and defined so that whenever this type of street is added to the feature class, its speed limit attribute is automatically set to 35 miles per hour.

topology

1. In geodatabases, the arrangement that constrains how point, line, and polygon features share geometry. For example, street centerlines and census blocks share geometry, and adjacent soil polygons share geometry. Topology defines and enforces data integrity rules (for example, there should be no gaps between polygons). It supports topological relationship queries and navigation (for example, navigating feature adjacency or connectivity), supports sophisticated editing tools, and allows feature construction from unstructured geometry (for example, constructing polygons from lines).

topology rule

1. An instruction to the geodatabase defining the permissible relationships of features within a given feature class or between features in two different feature classes.

version

1. [database structures] In databases, an alternative state of the database that has an owner, a description, a permission (private, protected, or public), and a parent version. Versions are not affected by changes occurring in other versions of the database.

APPENDIX E – EDITS

Fall 2016

				Added Water Features						
Edit No.	Name	Old Hydro ID	New Hydro ID	WBIC	Hyrdo Type	County	Town/Range (at mouth)	HUC 12	Latitude (at mouth)	Longitude (at mouth)
1	Black River Flowage 1610	N/A	600139648	1708800	Reservoir/Flowage	Jackson	T21N R04W	70400071004	44.297092	-90.84445
2	Lake Belle View	N/A	600139651	886000	Lake/Pond	Dane	T05N R08E	70900040502	42.861473	-89.534177
3	Unnamed (West Lake Belle View)	N/A	600139652	4000040	Reservoir/Flowage	Dane	T05N R08E	70900040502	42.860448	-89.535677
4	Leopolis Pond	N/A	600139650	301600	Reservoir/Flowage	Shawano	T27N R14E	40302021202	44.815675	-88.929971
5	Unnamed Pond	N/A	600139649	4000041	Lake/Pond	Washington	T10N R19E	40400030302	43.332849	-88.216579
6	Unnamed Stream	N/A	200325530	4000042	Stream/River	Oneida	T39N R10E	70700010404	45.852081	-89.208703
7	Unnamed Stream	N/A	200325533	4000044	Ditch/Canal	Rock	T02N R11E	70900021202	42.615606	-89.130019
8	Unnamed Stream	N/A	200004889; 200325535; 200325536	4000045	Ditch/Canal	Rock	T02N R11E	70900021202	42.61579	-89.136948

				Updated Water Feature Geometries						
Edit No.	Name	Old Hydro ID	New Hydro ID	WBIC	Hydro Type	County	Town/Range (at mouth)	HUC 12	Latitude (at mouth)	Longitude (at mouth)
9	Black River *(See Edit No. 1)*	600091826; 200090401	600139648; 200094543	1676700	Stream/River	Jackson	T21N R04W	70400071004	44.297092	-90.84445
10	Sugar River *(See Edit No. 2)*	600089728; 200015778; 200015653; 200288044	200015653	875300	Stream/River	Dane	T05N R08E	70900040502	42.860448	-89.535677
11	Unnamed Stream	200015690	200015690	5038337	Stream/River	Dane	T05N R08E	70900040502	42.860778	-89.538406
12	Unnamed Stream	200015556	200015556	0	Stream/River	Dane	T05N R08E	70900040502	42.860969	-89.533689
13	N. Branch Embarrass River *(See edit No. 4)*	600039412; 200211301	600039412; 600139654; 200211301; 200325540; 200325541	301300	Stream/River	Shawano	T27N R14E	40302021202	44.767569	-88.846308
14	Cedar Creek	200036485; 200036289; 200036268	200036313; 200036485	21300	Stream/River	Washington	T10N R19E	40400030302	43.331882	-88.21646
15	Clearwater Lake	600083243	600083243	1616400	Lake/Pond	Oneida	T39N R10E	70700010404	45.850456	-89.200195
16	Unnamed Lake	600083249	600083249	1154900	Lake/Pond	Oneida	T39N R10E	70700010404	45.85035	-89.20685
17	Hay River	200211559; 200211129; 600090935	200211559; 200211129; 600090935	2068600	Stream/River	Dunn	T31N R13W	70500070606	45.198398	-92.001152
18	Unnamed Pond	600075780	600075780	5575779	Unspecified Open Water	Jefferson	T06N R13E	70900020404	43.01674	-89.01045
19	Unnamed	600075757	600075757	5575756	Unspecified Open Water	Jefferson	T06N R13E	70900020404	43.01684	-89.01109
20	Bass Creek	200004889; 200004890; 200004902	200325538; 200325539; 200004902	795800	Stream/River	Rock	T02N R12E	70900021202	42.626174	-89.127305
21	Unnamed Stream	200004791	200004791; 200325542	5041300	Stream/River	Rock	T02N R11E	70900021202	42.62068	-89.130105

				Updated Existing Water Feature Attributes						
Edit No.	Name	Old Hydro ID	New Hydro ID	WBIC	Hydro Type	County	Town/Range (at mouth)	HUC 12	Latitude (at mouth)	Longitude (at mouth)
22	Namekagon River	600091889	600091889	2689500	Stream/River	Sawyer	T42N R08W	70300020207	46.155634	-91.334397
23	Esser Pond	600124435	600124435	783730 *(previously 99999)*	Lake/Pond	Dane	T07N R08E	70900020603	43.09122	-89.524086
24	Suukjak Sep Creek	200068899; 200070577; 200068982; 200068668; 200070600; 200069764; 200068183; 200070754; 200070365	200068899; 200070577; 200068982; 200068668; 200070600; 200069764; 200068183; 200070754; 200070365	1665800	Stream/River	Monroe	T18N R03W	70400060202	44.069465	-90.662003
25	Suukjak Sep Lake	600058086	600058086	1666000	Lake/Pond	Monroe	T18N R03W	70400060202	44.023225	-90.708775
26	Unnamed Stream	200005314; 200005148; 200005057	200005314; 200005148; 200005057	5041086	Stream/River	Rock	T02N R12E	70900021202	42.623189	-89.131952
27	Bass Creek	200005315; 200005298; 200005152	200005315; 200005298; 200005152	795800	Stream/River	Rock	T02N R12E	70900021202	42.623189	-89.131952

	Name	Old Hydro ID	New Hydro ID	WBIC	Hydro Type	County	Town/Range (at mouth)	HUC 12	Latitude	Longitude
28	Whitford Creek	200016560; 200017276; 200015830; 200016131	200016560; 200017276; 200015830; 200016131	911900	Stream/River	Iowa	T05N R04E	70900030403	42.892189	-90.038775
29	Schoeneberg Marsh	600089479	600089479	779750	Lake/Pond	Columbia	T10N R10E	70900020501	43.34782	-89.30651
30	Oneva Creek	200161595; 200161947; 200162096; 200162101; 200162128; 200162247; 200162366	200161595; 200161947; 200162096; 200162101; 200162128; 200162247; 200162366	476200	Stream/River	Forest	T34N R15E	40301040203	45.40136	-88.606155
31	Mercer Springs	600011448	600011448	1539300	Lake/Pond	Oneida	T39N R05E	70700010806	45.877285	-89.82598
32	Barrens Lake	600011506	600011506	602400	Lake/Pond	Florence	T39N R19E	40301080702	45.85907	-88.10123
33	Folz Pond	600011452	600011452	602200	Lake/Pond	Florence	T39N R19E	40301080702	45.861916	-88.099014
34	Unnamed Pond	600077737	600077737	5577736	Lake/Pond	Walworth	T04N R17E	71200060202	42.82749	-88.48795

Removed Existing Water Feature Geometries										
Edit No.	Name	Old Hydro ID	New Hydro ID	WBIC	Hydro Type	County	Town/Range (at mouth)	HUC 12	Latitude (at mouth)	Longitude (at mouth)
35	Mayfield Pond	600071026	N/A	24700	Lake/Pond	Washington	T10N R19E	40400030302	43.332363	-88.21833
36	Hay River	600028404; 600028336	N/A	2068600	Inundation Area	Dunn	T31N R13W	70500070606	45.198398	-92.001152
37	Unnamed	600028388	N/A	5528386	Unspecified Open Water	Dunn	T31N R13W	70500070606	45.19151	-92.00153
38	Unnamed	600028400	N/A	5528398	Unspecified Open Water	Dunn	T31N R13W	70500070606	45.19126	-92.00214
39	Unnamed	600005207	N/A	5505205	Lake/Pond	Sawyer	T42N R08W	70300020105	46.15554	-91.33441

Fall 2015

Added Water Features										
Name	Old Hydro ID	New Hydro ID	WBIC	Hyrdo Type	County	Town/Range (at mouth)	HUC 12	Latitude (at mouth)	Longitude (at mouth)	
Unnamed Stream	200288077	200288077	4000037	River/Stream	Marinette	T35N R20E	40301080905	45.47073	-87.98978	

Updated Water Feature Geometries									
Name	Old Hydro ID	New Hydro ID	WBIC	Hydro Type	County	Town/Range (at mouth)	HUC 12	Latitude (at mouth)	Longitude (at mouth)
Cherokee Lake	600073970	600124476	806500	Lake/Pond	Dane	T08N R09E	70900020504	43.157356	-89.379944
Yahara River	200028685; 200028846; 200029827; 200029599	600074149; 600074086	798300	River/Stream	Dane	T04N R12E	70900020504	42.792957	-89.12302
Token Creek	200029579; 200029559	200029559	806600	River/Stream	Dane	T08N R10E	70900020504	43.176655	-89.35851
Token Creek	200030890; 200030891; 200030665; 200030689; 200030632; 200030690	200030632; 200288081; 200288073; 200030791	806600	River/Stream	Dane	T08N R10E	70900020503	43.176655	-89.35851
Unnamed Stream	200031017	200031128	5033839	River/Stream	Dane	T09N R10E	70900020503	43.20581	-89.278885
Unnamed Stream	200028702; 200028629	600074110; 600074082	806300	River/Stream	Dane	T08N R09E	70900020504	43.154278	-89.38489
Little Wausaukee Creek	200288066	200288066	611500	River/Stream	Marinette	T34N R20E	40301080905	45.38069	-87.94353
Hat Rapids Flowage	600018492	600124480	1567325	Reservoir/Flowage	Oneida	T36N R08E	70700011302	45.586334	-89.46456
Montgomery Lake	600080455	600080455	738200	Reservoir/Flowage	Kenosha	T01N R20E	71200040101	42.552032	-88.08686
Unnamed	200019958	200019958	4000039	Ditch/Canal	Iowa	T06N R05E	70900030601	42.949	-89.939
Menominee River (Sturgeon Falls Flowage)	600124483	600124483	646900	Reservoir/Flowage	Marinette	T38N R21E	40301080706; 40301080707; 40301080408	45.74141	-87.86387
Menominee River	600091260	200288084; 200178839; 200212098	609000	River/Stream	Marinette	T30N R24E	40301080706; 40301080707; 40301080408	45.094894	-87.59342

Fall 2015 edits continued on next page

Updated Existing Water Feature Attributes									
Name	Old Hydro ID	New Hydro ID	WBIC	Hydro Type	County	Town/Range (at mouth)	HUC 12	Latitude (at mouth)	Longitude (at mouth)
Cherry Valley Creek	200044979; 200045087; 200044934; 200045016; 200044788; 200044886; 200045350	200044979; 200045087; 200044934; 200045016; 200044788; 200044886; 200045350	4000038	River/Stream	Richland	T12N R01W	70700051102	43.524	-90.488
Mason Lake	600065099	600065099	175700	Reservoir/Flowage	Marquette/Adams	T14N R08E	40302010203	43.657795	-89.60795
Big Spring Creek	200051933	200051799	176400	River/Stream	Adams	T14N R07E	40302010203	43.664883	-89.63803
Unnamed Stream	200052197	200051937	176300	River/Stream	Adams	T14N R07E	40302010203	43.67223	-89.60886
Unnamed Stream	200165085; 200288070	200165085; 200288070	4000036	River/Stream	Marinette	T34N R20E	40302010203	45.448	-87.998
Eau Claire River	600039579	600039579	2125600	River/Stream	Eau Claire	T27N R09W	70500050502; 70500060301; 70500060304; 70500060506; 70500060507; 70500060508; 70500060509	44.811703	-91.50321
Rieboldt Creek	200148053; 200148323; 200149217; 200149367; 200149665; 200149914; 200150422; 200150423	200148053; 200148323; 200149217; 200149367; 200149665; 200149914; 200150422; 200150423	99000	River/Stream	Door	T30N R28E	40301020103	45.09493	-87.081726
Peil Creek	200145027; 200145303	200145027; 200145303	98700	River/Stream	Door	T30N R27E	40301020105	45.05535	-87.16484
Muehl Springs	200061515; 200061534; 200061572; 200061578; 200061663; 200061677; 200061717; 200061594; 200061622	200061515; 200061534; 200061572; 200061578; 200061663; 200061677; 200061717; 200061594; 200061622	5026271; 58700	River/Stream	Sheboygan	T16N R21E	40301011106	43.863983	-88.02073
Kuplic Lake	600034882	600034882	422600	Lake/Pond	Oconto	T28N R19E	40301040403	44.93102	-88.1812
Bosak Lake	600016814	600016814	2666000	Lake/Pond	Polk	T37N R16W	70300010903	45.643246	-92.33826
Black Bear Lake	600017976	600017976	2669200	Lake/Pond	Polk	T36N R15W	70300010902	45.596146	-92.177086
Birch Creek	200204165; 200204275; 200204347; 200204470; 200204880	200204165; 200204275; 200204347; 200204470; 200204880	2833500	River/Stream	Douglas	T48N R13W	40103010502	46.622833	-92.03065
Smith Conley Creek	200019957; 200019958	200019957; 200019958	914100	River/Stream	Iowa	T05N R05E	70900030601	42.939754	-89.92059
Removed Existing Water Feature Geometries									
Name	Old Hydro ID	New Hydro ID	WBIC	Hydro Type	County	Town/Range (at mouth)	HUC 12	Latitude (at mouth)	Longitude (at mouth)
Unnamed Stream*	200051933	N/A	5028689	River/Stream	Adams	T14N R07E	40302010203	43.66352	-89.62684
Unnamed Stream*	200052197	N/A	5028600	River/Stream	Adams	T14N R07E	40302010203	43.665752	-89.60532
Token Creek Pond	600073405	N/A	5573404	Reservoir/Flowage	Dane	T09N R10E	70900020503	43.202312	-89.28549
Unnamed**	600013775	N/A	5513773	Unspecified Open Water	Marinette	T38N R21E	40301080706	45.75332	-87.89024
Unnamed**	600013759	N/A	5513757	Unspecified Open Water	Marinette	T38N R21E	40301080706	45.7523	-87.88006
Unnamed**	600090830	N/A	5004248	River/Stream	Marinette	T38N R21E	40301080706	45.751793	-87.87542
Unnamed**	600013763	N/A	5513761	Unspecified Open Water	Out of State	Out of State	40301080706	45.753757	-87.89464
Unnamed**	600013719	N/A	5004165	River/Stream	Out of State	Out of State	40301080706	45.754627	-87.88612
Menominee River **	600013725	N/A	609000	Backwater	Out of State	Out of State	40301080706	45.755	-87.883
Menominee River **	600013663	N/A	609000	Backwater	Out of State	Out of State	40301080706	45.756	-87.875
Unnamed**	600013790	N/A	5004263	River/Stream	Out of State	Out of State	40301080408	45.752	-87.858

Replaced by Updated Water Feature Attributes (see Mason Lake 175700)

*** Replaced by Updated Water Feature Geometry (see Sturgeon Falls Flowage 646900)*

July 2015

- **Added water features** based on 2010 Wisconsin Regional Orthophoto Consortium (WROC) aerial photography and WDNR Fish Surveys.
    - Lunda Community Park Pond (HYDROID: 600124469 / WBIC: 4000024 / HYDROTYPE: Lake/Pond)
    - Unnamed (HYDROID: 600124473 / WBIC: 4000028 / HYDROTYPE: Lake/Pond)
    - Brown Deer Pond 4 (HYDROID: 600124472 / WBIC: 4000025 / HYDROTYPE: Lake/Pond)

- o Warnimont Pond (HYDROID: 600124471 / WBIC: 4000026 / HYDROTYPE: Lake/Pond)
- o Root River Parkway Pond 3 (HYDROID: 600124470 / WBIC: 4000027 / HYDROTYPE: Lake/Pond)
- o Unnamed (HYDROID: 200288049 / WBIC: 4000029 / HYDROTYPE: Stream/River, single-line)
- o Unnamed (HYDROID: 200288051 / WBIC: 4000030 / HYDROTYPE: Stream/River, single-line)
- o Unnamed (HYDROID: 200288095 / WBIC: 4000031 / HYDROTYPE: Stream/River, single-line)
- o Unnamed (HYDROID: 200288054 / WBIC: 4000032 / HYDROTYPE: Stream/River, single-line)
- o Unnamed (HYDROID: 200288056 / WBIC: 4000033 / HYDROTYPE: Stream/River, single-line)
- o Unnamed (HYDROID: 200288057 / WBIC: 4000034 / HYDROTYPE: Stream/River, single-line)
- o Unnamed (HYDROID: 200288065 / WBIC: 4000035 / HYDROTYPE: Stream/River, single-line)
- o Unnamed (HYDROID: 200288066 / WBIC: 611500 / HYDROTYPE: Stream/River, single-line)
- **Updated water feature geometries** based on 2010 Wisconsin Regional Orthophoto Consortium (WROC) aerial photography.
  - o Vern Wolf Lake (HYDROID: 600089724 / WBIC: 739100 / HYDROTYPE: Lake/Pond)
  - o Fourteenmile Creek (HYDROID: 200082699 / WBIC: 1377500 / HYDROTYPE: Stream/River Centerline)
  - o Trinity Creek (HYDROID: 200031500 / WBIC: 20400 / HYDROTYPE: Stream/River, single-line)
  - o Unnamed (HYDROID: 200197724 / WBIC: 5002631 / HYDROTYPE: Stream/River, single-line)
  - o Unnamed (HYDROID: 200288064 / WBIC: 644800 / HYDROTYPE: Stream/River, single-line)
  - o Mullaney Creek (HYDROID: 200172097 / WBIC: 636100 / HYDROTYPE: Stream/River, single-line)
  - o Morgan Creek (HYDROID: 200181069,200288093,200288094 / WBIC: 666200 / HYDROTYPE: Stream/River, single-line)
  - o Gardner Creek (HYDROID: 200131580 / WBIC: 327200 / HYDROTYPE: Stream/River, single-line)
  - o Unnamed (HYDROID: 200167991 / WBIC: 3000155 / HYDROTYPE: Stream/River, single-line)
  - o Unnamed (HYDROID: 200288091 / WBIC: 546400 / HYDROTYPE: Stream/River, single-line)
  - o Unnamed (HYDROID: 200288060 / WBIC: 389500 / HYDROTYPE: Stream/River, single-line)
  - o Iron River (HYDROID: 200206658,600090745 / WBIC: 2872000 / HYDROTYPE: Stream/River Centerline)
  - o Iron River (HYDROID: 600090745 / WBIC: 2872000 / HYDROTYPE: Stream/River)
- **Updated existing water feature attributes.**
  - o Unnamed (HYDROID: 200197821 / WBIC: 5002631 / HYDROTYPE: Stream/River, single-line)
- **Removed existing water feature geometries.**
  - o Unnamed (HYDROID: 200197820 / WBIC: 2925700 / HYDROTYPE: Stream/River, single-line)
  - o Orienta Flowage (HYDROID: 600000271 / WBIC: 2872200 / HYDROTYPE: Reservoir Flowage)

October 30, 2014

- **Added water features** based on 2010 Wisconsin Regional Orthophoto Consortium (WROC) aerial photography.
  - o Schowalter Park Pond (HYDROID: 600124438/ WBIC: 13050)
  - o Willowbrooke Park Pond (HYDROID: 600124439/ WBIC: 12330)
  - o Oneida Lake (HYDROID: 600124441 / WBIC: 4000023)
  - o Southwick Creek (HYDROID: 200288008 / WBIC: 758600)
  - o Granton Park Pond (HYDROID: 600124443 / WBIC: 1670820)
- **Updated water feature geometries** based on 2010 Wisconsin Regional Orthophoto Consortium (WROC) aerial photography.
  - o Sinnissippi Lake (HYDROID: 600091225 / WBIC: 859900)
  - o Extending Sevenmile Creek (HYDROID: 200287999 / WBIC: 1387000)

- o   Tombeau Lake (HYDROID: 600090583 / WBIC: 743800)
- **Removed existing water feature geometries**.
  - o   Unnamed stream (HYDROID: 200084662 / WBIC: 5022076)
- **Updated existing water feature attributes**
  - o   Grand Lake (HYDROID: 600089724 / WBIC: 161100)
  - o   Little Green (HYDROID: 600063695 / WBIC: 162500)
  - o   Big Twin Lake (HYDROID: 600062560 / WBIC: 146500)

Note: For previous update details, see [Appendix E](#).

Spring 2014 and Initial Geodatabase Load

- **The addition of all linework for all 8 digit HUCs that touch Wisconsin.** This completes the hydrologic network to facilitate flow modeling of water into and out of the state. The linework was obtained from the National Hydrography Dataset (NHD).
- **IN_STATE_CODE** - allows you to turn off all of the new linework outside of the state for cartographic purposes. 0 = out of state, 1 = In State (includes buffer area from WDNR 24K Hydro)
- **Additional water features** added based on 2010 Wisconsin Regional Orthophoto Consortium (WROC) aerial photography.
- **The addition of Lake Superior and Lake Michigan** with flow connections from all of their tributaries. (Note: The source of this information is the 1:24,000-scale NHD - USGS National Hydrography Database)
- **A hydrography junction feature class** - junctions allow two or more lines to connect, and facilitate the transfer of flow between them. Hydrography junction subtypes indicate intersections at headwaters, stream confluences, shoreline intersections, etc.
- **The hydrography bank feature class holds all of the shorelines** separately from the water features. Water Body Identification Codes (WBICs) for shorelines are available by linking the bank feature class to the water area feature class via the "WATERBODYHYDROID" field.
- **The "HYDROID" field replaces both "SW_NO" and "SHAID_NO"** as the unique identifier for each feature, and is now unique across the entire database.
- **A new point feature class** has been created for future support of features such as springs, gauge stations, dams etc. However, this feature class is currently empty.
- **Cartographic features such as original water course, channel in water area and wall features** (e.g. fish hatchery walls, earthen walls, etc.) are now stored in a separate feature class called "W23324.WD_HYDRO_LINE_LN_24K".
- **A new hydrography category of "UNSPECIFIED OPEN WATER"** has been added to identify areas of open water which have not been classified.