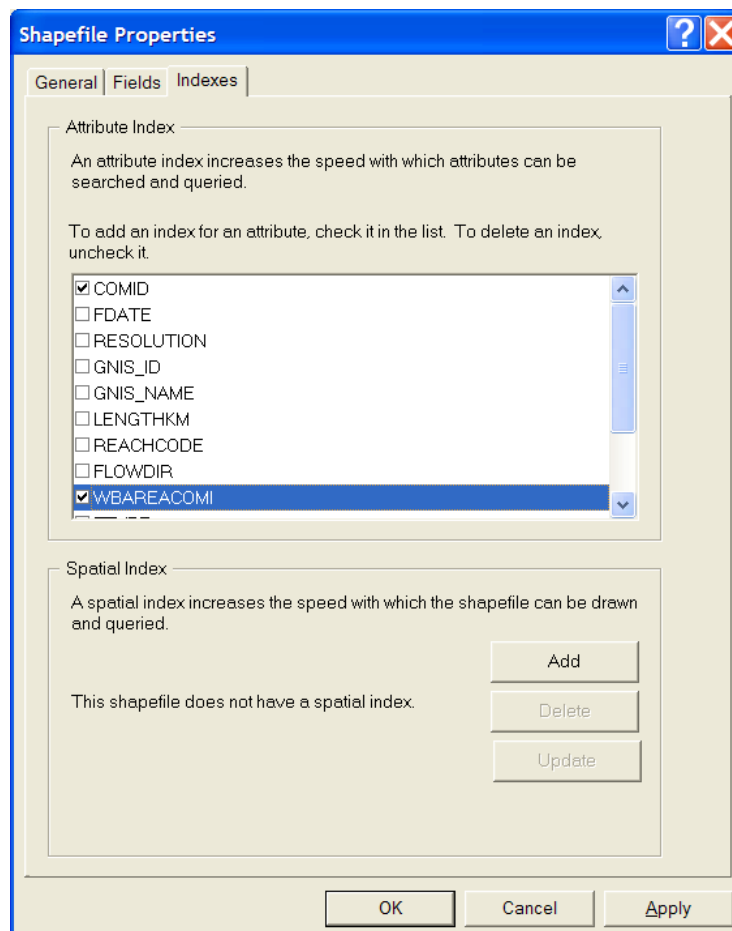


Exercise # 1: SETTING UP THE NHDPlus DATA – Last Updated 4/30/2008

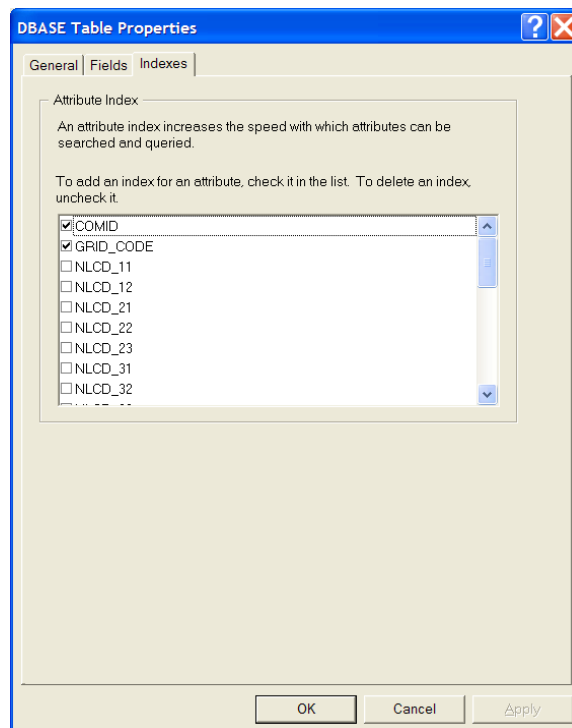
1. Start ArcCatalog.
2. Using ArcCatalog, build attribute and spatial indexes on the NHDPlus Shapefiles. Attribute and spatial indexes greatly improve performance when using the data in ArcGIS.
 - a. Right-click on NHDFlowline.shp in \NHDPlus06\Hydrography folder, go to **Properties, Indexes**. In the **Shapefile Properties** dialog box,
 - i. place a checkmark next to COMID to indicate that an attribute index should be created on this field.
 - ii. Place a checkmark next to WBAREACOMID to indicate that an attribute index should be created on this field.
 - iii. Click **Add** to indicate that a spatial index should be created.
 - iv. Click **OK** and the selected indexes will be created.



- b. Following the directions in step 2a, build additional attribute and spatial indexes according to the information in Table 1.

ShapeFile	Location	Attribute Indexes	Spatial Index
NHDArea	\NHDPlus06\Hydrography	COMID	Yes
NHDLine	\NHDPlus06\Hydrography	COMID	Yes
NHDPoint	\NHDPlus06\Hydrography	COMID	Yes
NHDWaterbody	\NHDPlus06\Hydrography	COMID	Yes
Catchment	\NHDPlus06\Drainage	COMID	Yes
Subbasin	\NHDPlus06\HydrologicUnits	HUC_8	Yes

3. Using ArcCatalog, build attribute indexes on dbf tables.
- Right-click on CATCHMENTATTRIBUTESNLCD.dbf in \NHDPlus06 folder, go to **Properties, Indexes**. In the **DBASE Table Properties** dialog box,
 - Place a checkmark next to COMID to indicate that an attribute index should be created on this field.
 - Place a checkmark next to GRID_CODE to indicate that an attribute index should be created on this field.
 - Click **OK** and the selected indexes will be created.

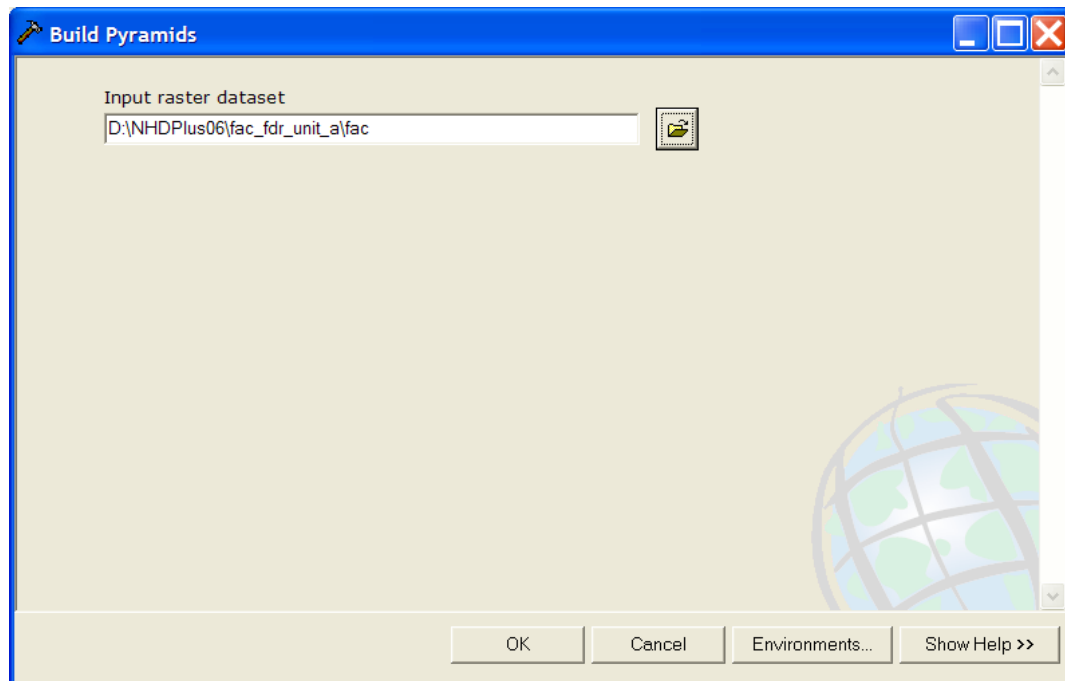


- b. Following the directions in step 3a, build additional attribute indexes according to the information in Table 2.

Table 2		
Table Name	Location	Attribute Indexes
Catchmentattributestempprecip	\NHDPlus06	COMID, GRID_CODE
Flowlineattributesflow	\NHDPlus06	COMID, GRID_CODE
Flowlineattributesnlcd	\NHDPlus06	COMID, GRID_CODE
Flowlineattributestempprecip	\NHDPlus06	COMID, GRID_CODE
Headwaternodeareas	\NHDPlus06	COMID, GRID_CODE
NHDFeatureToMetadata	\NHDPlus06	COMID, DUUID
NHDFlow	\NHDPlus06	FROMCOMID, TOCOMID
NHDFlowlineVAA	\NHDPlus06	COMID
NHDMetadata	\NHDPlus06	DUUID
NHDSourceCitation	\NHDPlus06	DUUID

4. Using ArcCatalog, build pyramids on grid files. Pyramids are reduced resolution grids that are used when an ArcGIS display is zoomed out. Especially in ArcGIS 9.x, pyramids greatly improve performance.
 - a. Right-click on elev_cm in \NHDPlus06\elev_unit_a folder, select **Build Pyramids**. When the **Build Pyramids** dialog box appears, click **OK**. ArcCatalog will commence building the pyramids. Depending on the size of the grid and the speed of your computer, building pyramids may take 30 minutes or more.

Note: Users have reported problems building pyramids on some of the largest grids on computers having less than 1 GB of RAM.



- b. Following the directions in step 4a, build pyramids on the remaining files according to the information in Table 3.

Table 3	
Grid File Name	Location
Fac	\NHDPlus06\fac_fdr_unit_a
Fdr	\NHDPlus06\fac_fdr_unit_a
Cat	\NHDPlus06\Drainage

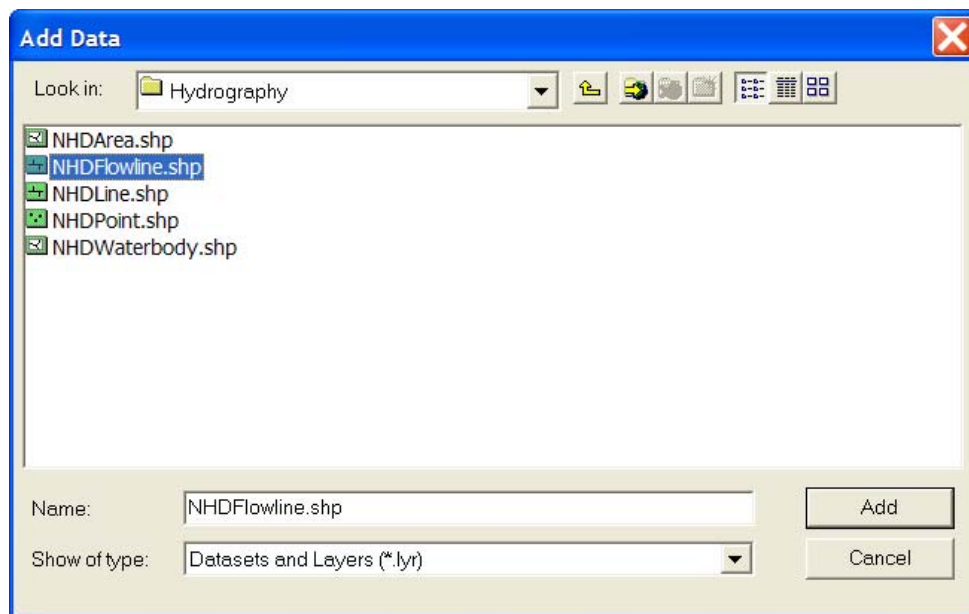
5. Close ArcCatalog.
6. Open ArcMap.
7. Using ArcMap, build relates between Feature Classes.

If you are unfamiliar with the purpose and use of relates, ArcMap Help is a good reference.

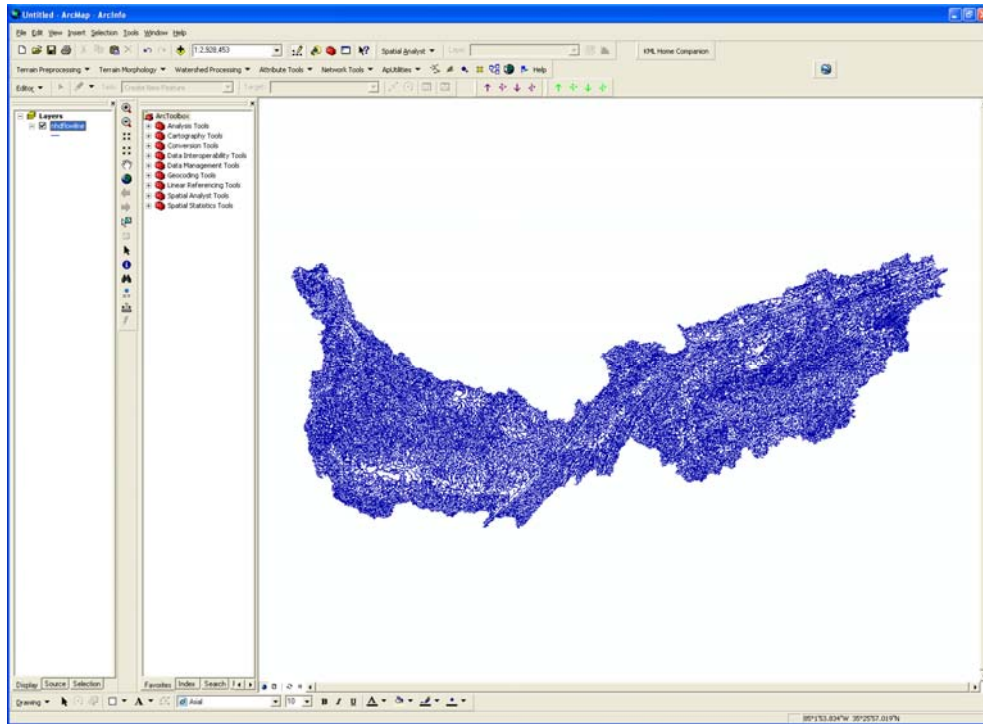
Before creating relates, study the NHDPlus schema diagram in the “NHDPlus User Guide”. Every line in the diagram that connects two feature classes or a feature class and an attribute table can be represented by an ArcMap relate.

Table 5 describes all of the valid relates and joins in NHDPlus. Since relates and joins exist only in an ArcMap session, there is no need to create each of the ones listed in table 5 during this exercise. When using NHDPlus for a project, notes that relates and joins use system resources, so it is best to create only those needed for a particular task at hand.

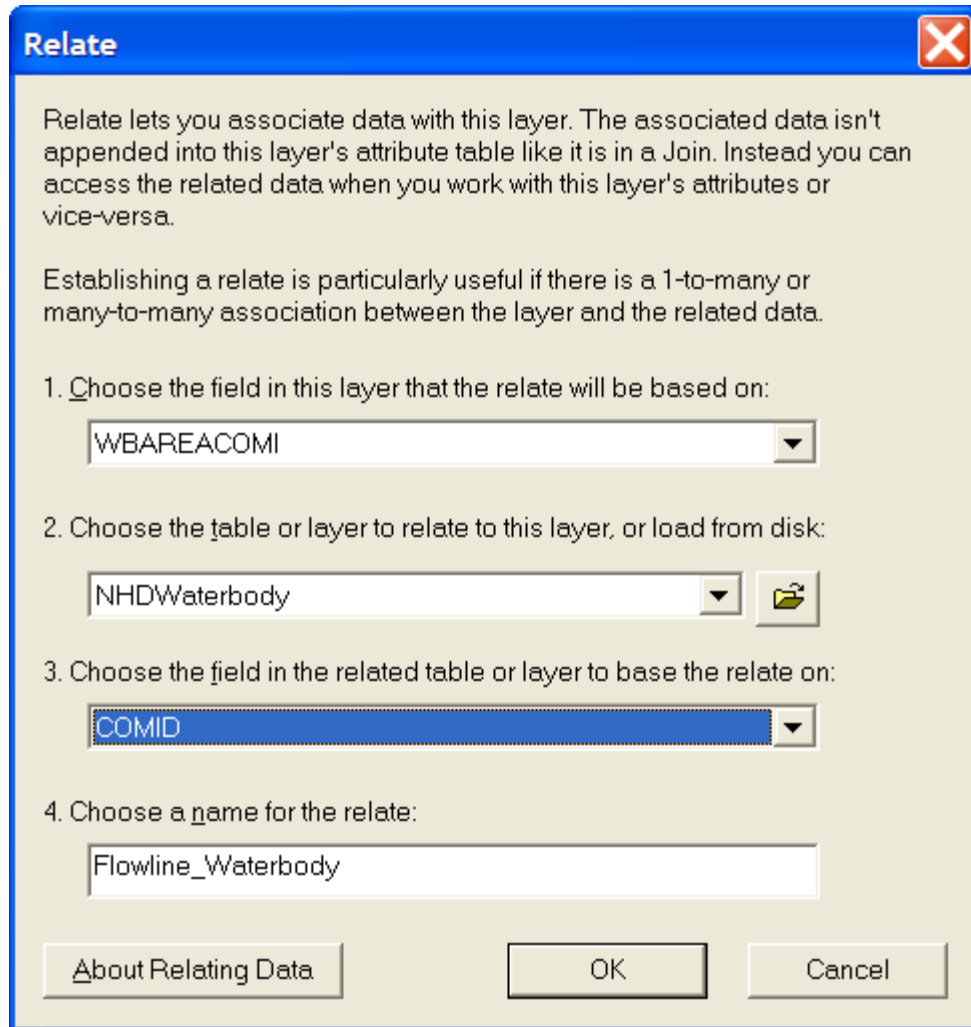
- a. Go to **File, Add Data**. In the **Add Data** dialog box, navigate to the \NHDPlus06\Hydrography directory and select NHDFlowline.shp. Click **Add**.



The NHDFlowline feature class will be added to your map.



- b. This step creates a relate between NHDFlowline.shp and NHDWaterbody.shp. Right-click on NHDFlowline in the **Layer** list, go to **Joins and Relates**, then **Relate...** In the **Relate** dialog box,
- i. Use the pulldown list in item 1, select WBAREACOMI.
 - ii. Use the **Folder** icon in item 2, navigate to \\NHDPlus06\Hydrography and select NHDWaterbody.shp.
 - iii. Use the pulldown list in item 3 and select COMID.
 - iv. In item 4, enter the name of the relate **Flowline_Waterbody**.
 - v. Click **OK**.



- c. Following the directions in steps 7a and b, build additional relates between feature classes according to the information in Table 4. Remember that the feature class listed in the “**From Feature Class**” column of Table 4, must be added to the map before building a relate from it. With the exception of grids, the feature class listed in the “**To Feature Class**” column need not be added to the map prior building a relate to it.

Table 4

From Feature Class	Location	Relate Field	To Feature Class	Location	Relate Field	Name of Relate
NHDFlowline.shp	\NHDPlus06\hydrography	ComID	Catchment.shp	\NHDPlus-6\Drainage	ComID	Flowline_Catshp
cat (grid)	\NHDPlus06\Drainage	Value	Catchment.shp	\NHDPlus06\Drainage	Grid_code	Catshp_Catgrid
cat (grid)	\NHDPlus06\Drainage	ComID	NHDFlowline.shp	\NHDPlus06\hydrography	ComID	Flowline_Catgrid

- d. Following the directions in steps 7a and b, you may build additional relates between feature classes and attribute tables according to the information in Table 5. Remember that the feature class listed in the “**From Feature Class**” column of Table 5, must be added to the map before the relate can be built from it. The table listed in the “**To Attribute Table**” column need not be added to the map to build a relate to it.

Table 5

From Feature Class	Location	Relate Field	To Attribute Table	Location	Relate Field	Name of Relate
NHDFlowline.shp	\\NHDPlus06\hydrography	Fcode	NHDFcode	\\NHDPlus06	Fcode	Flowline_Fcode
NHDFlowline.shp	\\NHDPlus06\hydrography	ComID	NHDFeatureToMetadata	\\NHDPlus06	ComID	Flowline_Metadata
NHDFlowline.shp	\\NHDPlus06\hydrography	ComID	NHDFlow	\\NHDPlus06	FromComID	Flowline_Outflows
NHDFlowline.shp	\\NHDPlus06\hydrography	ComID	NHDFlow	\\NHDPlus06	ToComID	Flowline_Inflows
NHDFlowline.shp	\\NHDPlus06\hydrography	ComID	NHDFlowlineVAA	\\NHDPlus06	ComID	Flowline_VAA
NHDFlowline.shp	\\NHDPlus06\hydrography	ComID	FlowLineAttributesFlow	\\NHDPlus06	ComID	Flowline_Flow
NHDFlowline.shp	\\NHDPlus06\hydrography	ComID	FlowLineAttributesNLCD	\\NHDPlus06	ComID	Flowline_NLCD
NHDFlowline.shp	\\NHDPlus06\hydrography	ComID	FlowlineAttributesTempPrecip	\\NHDPlus06	ComID	Flowline_TempPrecip
NHDFlowline.shp	\\NHDPlus06\hydrography	ComID	HeadwaterNodeAreas	\\NHDPlus06	ComID	Flowline_HWNodeAreas
NHDFlowline.shp	\\NHDPlus06\hydrography	ComID	CatchmentAttributesNLCD	\\NHDPlus06	ComID	Flowline_CatNLCD
NHDFlowline.shp	\\NHDPlus06\hydrography	ComID	CatchmentAttributesTempPrecip	\\NHDPlus06	ComID	Flowline_CatTempPrecip
NHDFlowline.shp	\\NHDPlus06\hydrography	ReachCode	NHDReachCrossReference	\\NHDPlus06	NewReachCo	Flowline_ReachXREF
NHDFlowline.shp	\\NHDPlus06\hydrography	ComID	NHDVerticalRelationship	\\NHDPlus06	AboveComID	Flowline_Above
NHDFlowline.shp	\\NHDPlus06\hydrography	ComID	NHDVerticalRelationship	\\NHDPlus06	BelowComID	Flowline_Below
NHDLine.shp	\\NHDPlus06\hydrography	Fcode	NHDFcode	\\NHDPlus06	Fcode	Line_Fcode
NHDLine.shp	\\NHDPlus06\hydrography	ComID	NHDFeatureToMetadata	\\NHDPlus06	ComID	Line_Metadata
NHDArea.shp	\\NHDPlus06\hydrography	Fcode	NHDFcode	\\NHDPlus06	Fcode	Area_Fcode
NHDArea.shp	\\NHDPlus06\hydrography	ComID	NHDFeatureToMetadata	\\NHDPlus06	ComID	Area_Metadata
NHDPoint.shp	\\NHDPlus06\hydrography	Fcode	NHDFcode	\\NHDPlus06	Fcode	Point_Fcode
NHDPoint.shp	\\NHDPlus06\hydrography	ComID	NHDFeatureToMetadata	\\NHDPlus06	ComID	Point_Metadata
NHDPoint.shp	\\NHDPlus06\hydrography	ReachCode	NHDReachCrossReference	\\NHDPlus06	NewReachCo	Point_ReachXREF
NHDWaterbody.shp	\\NHDPlus06\hydrography	Fcode	NHDFcode	\\NHDPlus06	Fcode	Waterbody_Fcode
NHDWaterbody.shp	\\NHDPlus06\hydrography	ComID	NHDFeatureToMetadata	\\NHDPlus06	ComID	Waterbody_Metadata
NHDWaterbody.shp	\\NHDPlus06\hydrography	ReachCode	NHDReachCrossReference	\\NHDPlus06	NewReachCo	Waterbody_ReachXREF
Catchment.shp	\\NHDPlus06\Drainage	ComID*	CatchmentAttributesNLCD	\\NHDPlus06	ComID	Catshp_CatNLCD
Catchment.shp	\\NHDPlus06\Drainage	ComID*	CatchmentAttributesTempPrecip	\\NHDPlus06	ComID	Catshp_CatTempPrecip
Catchment.shp	\\NHDPlus06\Drainage	ComID*	HeadwaterNodeAreas	\\NHDPlus06	ComID	Catshp_HWNodeAreas
cat (grid)	\\NHDPlus06\Drainage	ComID*	CatchmentAttributesNLCD	\\NHDPlus06	ComID	Catgrid_CatNLCD
cat (grid)	\\NHDPlus06\Drainage	ComID*	CatchmentAttributesTempPrecip	\\NHDPlus06	ComID	Catgrid_CatTempPrecip
cat (grid)	\\NHDPlus06\Drainage	ComID*	HeadwaterNodeAreas	\\NHDPlus06	ComID	Catgrid_HWNodeAreas

Some of the relates shown in Table 5 may also be useful as Joins rather than Relates (see Note below). Joins should be used when you wish to symbolize a feature class based on a field in an associated table. Additional information about Joins can be found in the ArcMap Help. Step e illustrates the process of creating a Join. For example, if you wish to symbolize NHD Flowlines by stream order, you would join NHDFlowline.shp and NHDFlowlineVAA.dbf.

Note: Joins are only appropriate between tables that have a 1-to-1 or many-to-one relationship. Please refer to the schema diagram in the NHDPlus User Guide to learn about the relationship between tables.

- e. Build a join between NHDFlowline.shp and NHDFlowlineVAA.dbf. Right-click on NHDFlowline in the **Layer** list, go to **Joins and Relates, Joins**. In the **Join Data** dialog box,
 - i. Use the pulldown list in item 1, select ComID.
 - ii. Using the **Folder** icon in item 2, navigate to the NHDFlowlineVAA.dbf file in \NHDPlus06.
 - iii. Use the pulldown list in item 3 and select COMID.
 - iv. Click **OK**.

Join Data



Join lets you append additional data to this layer's attribute table so you can, for example, symbolize the layer's features using this data.

What do you want to join to this layer?

Join attributes from a table

1. Choose the field in this layer that the join will be based on:

COMID

2. Choose the table to join to this layer, or load the table from disk:

NHDFlowlineVAA



Show the attribute tables of layers in this list

3. Choose the field in the table to base the join on:

COMID

Advanced...

About Joining Data

OK

Cancel