

Exercise # 1: SETTING UP THE NHDPlus DATA – Last Updated 04/06/2017

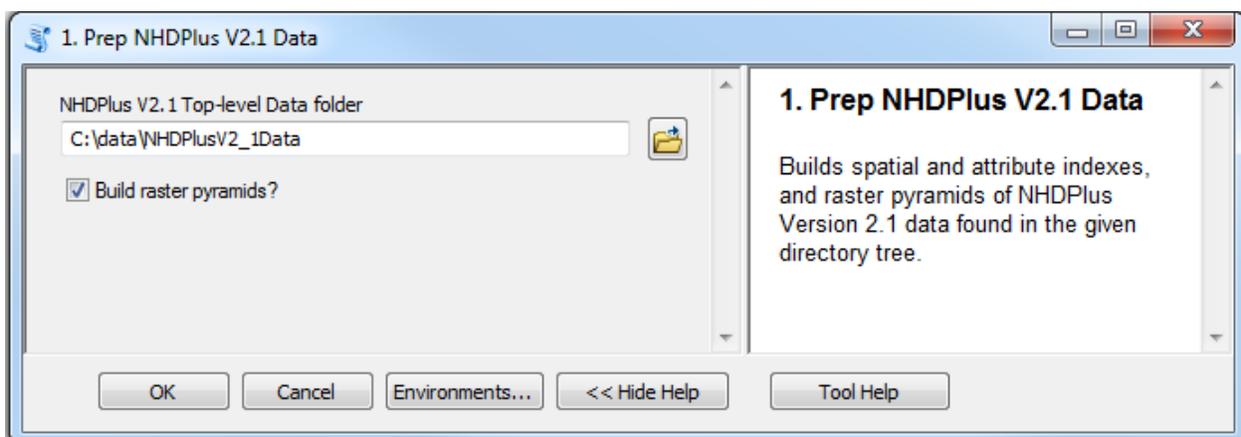
Within this document, the term NHDPlus is used when referring to NHDPlus Version 2.1 (unless otherwise noted).

The NHDPlus Version 2.1 data are distributed in a highly compressed format that does not include attribute or spatial indexes, or raster pyramids. To use the datasets most efficiently in ArcGIS, these indexes and pyramids should be built. A tool is provided to automate this process. The following procedure describes the use of the tool. The tool walks through an entire directory tree starting with the top-level folder given by the user, and builds the appropriate indexes or pyramids for any NHDPlus Version 2.1 datasets it finds in any folder under the top-level folder.

The tools described in Parts 1 and 3 of this exercise will work on any NHDPlus Version 2.1 data you have downloaded and unzipped. The examples shown in Part 2 of this exercise use data from VPU 06: specifically the NHDSnapshot and NHDPlusAttributes components. You may readily substitute NHDSnapshot and NHDPlusAttributes components from any VPU to do this exercise.

Part 1—Build Indexes and Raster Pyramids

1. Start ArcCatalog.
2. Using ArcCatalog, navigate to the location in which you unpacked the NHDPlus V2.1 Toolbox in Exercise 0, or by following the User Guide section on Installing NHDPlus V2 Data. Double-click on the “1. Prep NHDPlus V2.1 Data” tool, and use the browse tool to navigate to the top-level folder in which you have unpacked whatever NHDPlus V2.1 data you wish to use. If you want to build raster pyramids, check the box. Note that building raster pyramids can take a long time. (The process for the entire collection of V2.1 data took more than 8 hours.) When ready, click **OK**.



Next, we will look at relates and joins between feature classes and tables. The following steps are optional, and should be performed only when needed.

Part 2—Relates and Joins

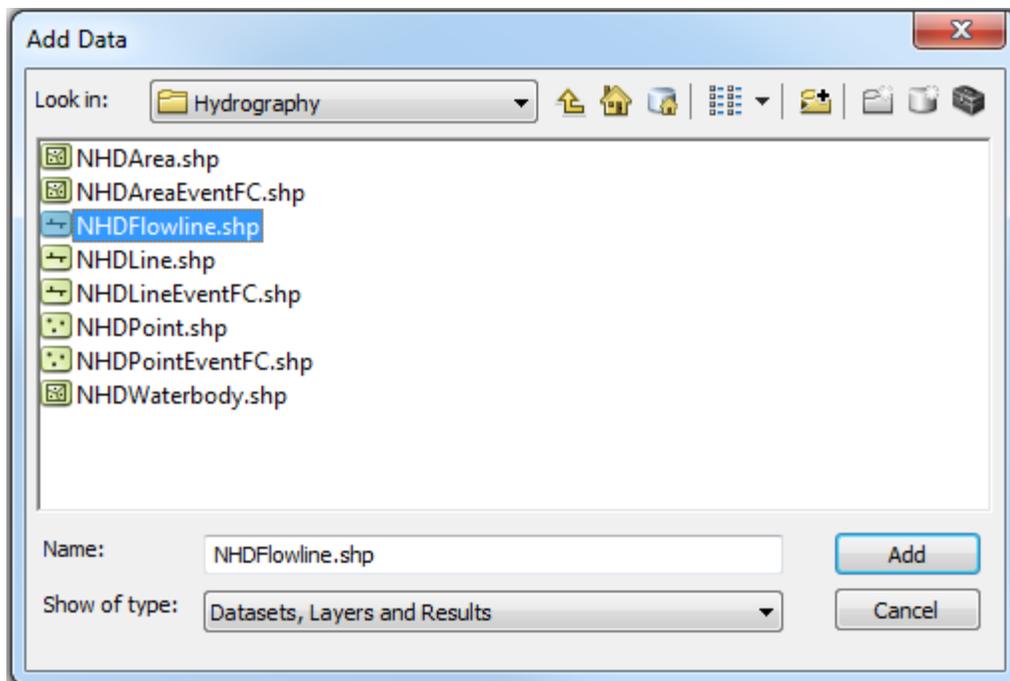
1. Close ArcCatalog, open ArcMap.
2. Using ArcMap, build relates between Feature Classes.

If you are unfamiliar with the purpose and use of relates and joins, see this reference:

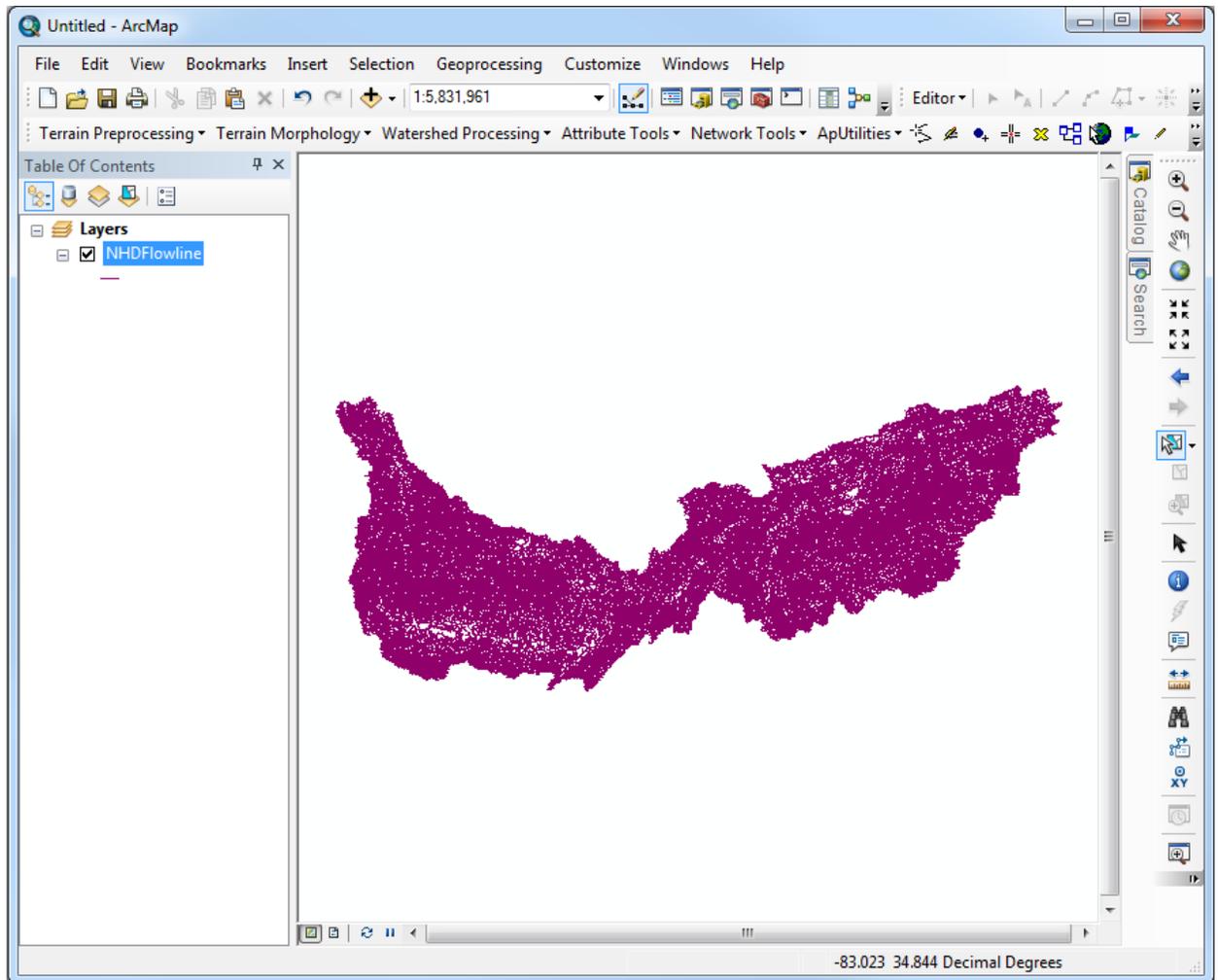
<http://resources.arcgis.com/en/help/main/10.1/index.html#//005s0000002n000000>
[0](#)

Before adding relates, read the NHDPlus V2.1 Data Structure section in the NHDPlusV2.1 User Guide. Relates and Joins use system resources, so it is best to add only those needed for a particular task at hand. For this example, we will add a relate between the NHDFlowline and NHDWaterbody feature classes.

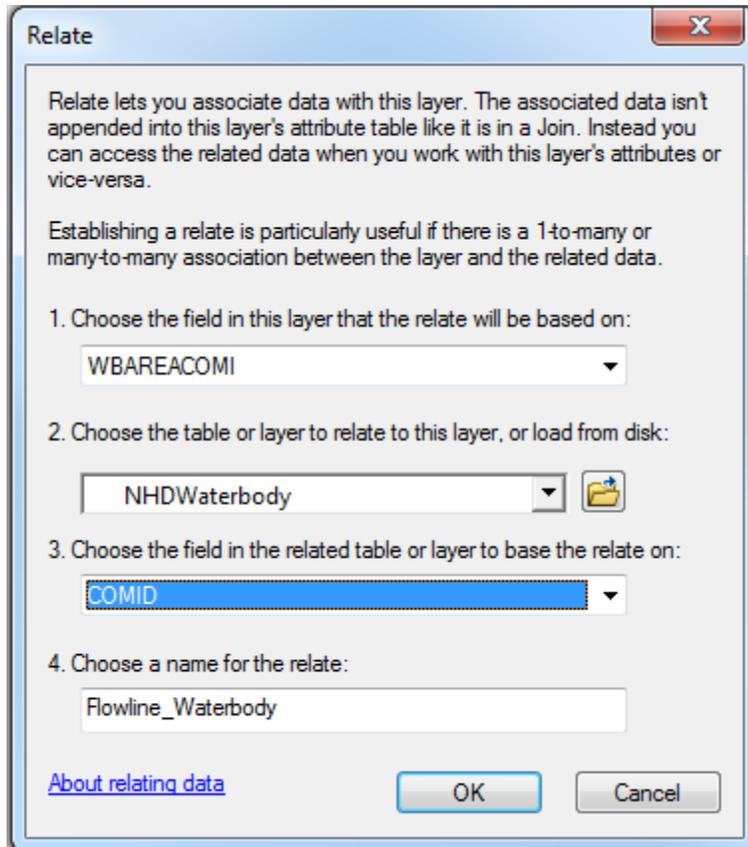
- a. Go to **File, Add Data**. In the **Add Data** dialog box, navigate to the \NHDPlus06\NHDSnapshot\Hydrography directory and select NHDFlowline.shp. Click **Add**.



The NHDFlowline feature class will be added to your map.



- b. This step adds a relate between NHDFlowline.shp and NHDWaterbody.shp. Right-click on NHDFlowline in the **Layer** list, go to **Joins and Relates, Relate...** In the **Relate** dialog box,
 - i. Use the pulldown list in item 1, select WBAREACOMI.
 - ii. Using the  icon in item 2, navigate to 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. To use the relate, open the attribute table for the NHDFlowline feature class. Select one or more NHDflowline features that should have a relationship with a NHDWaterbody polygon (e.g. artificial paths passing through water bodies.) From the Table Options menu, choose Related Tables>Flowline_Waterbody. The NHDWaterbody feature class will be added to the map, and its table will be opened, with the water bodies related to the selected NHDFlowlines selected and highlighted.
- d. Following the directions in steps 2a and b, additional relates between feature classes may be added according to the information in Table 1. 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. Additional relates other than those shown are possible. Refer to the NHDPlus V2.1 User Guide for more information.

From Feature Class	Relate Field	To Feature Class	Relate Field	Name of Relate
NHDFlowline.shp	ComID	Catchment.shp	FeatureID	Flowline_Catshp
Catchment.shp	Grid_code	cat (grid)	Value	Catshp_Catgrid
NHDFlowline.shp	ComID	cat (grid)	FeatureID	Flowline_Catgrid

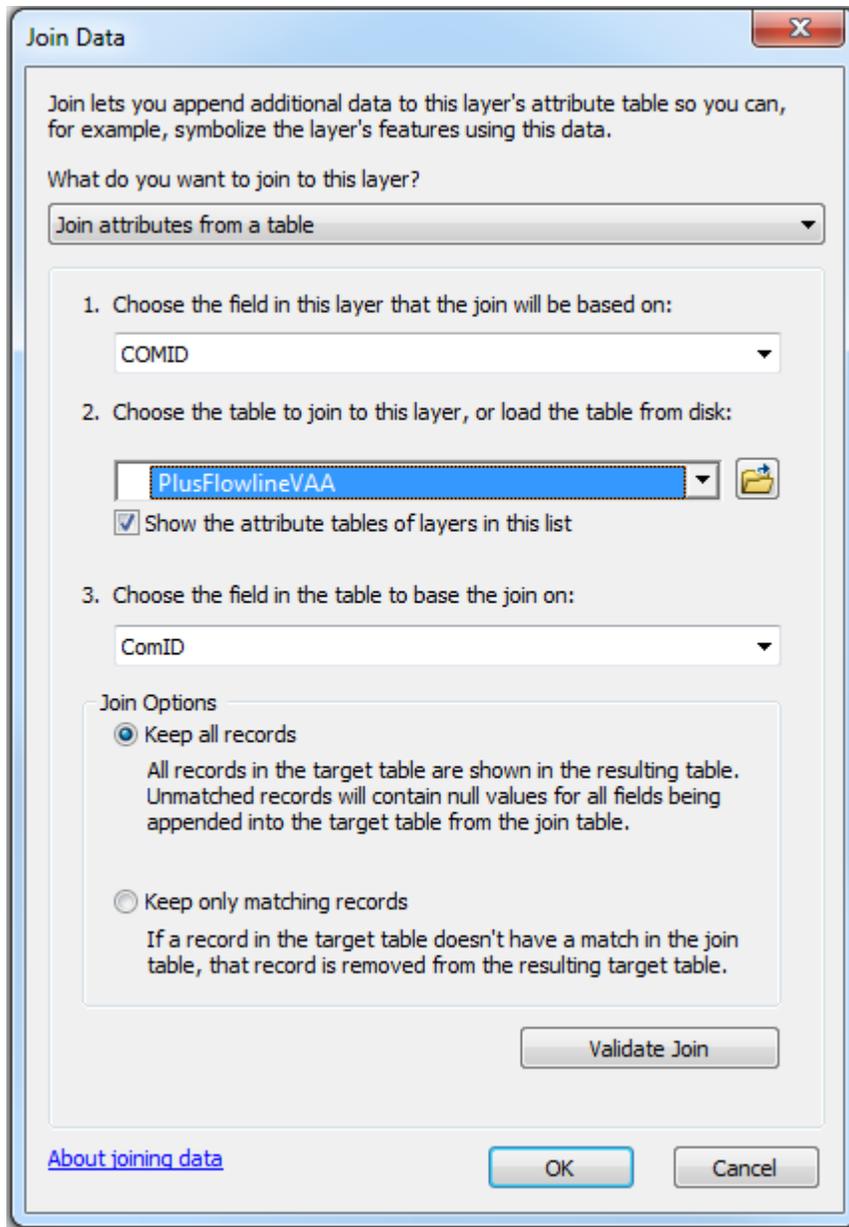
- e. Following the directions above, you may build additional relates between feature classes and attribute tables according to the information in Table 5. Remember that the feature class listed in the “**From Feature Class**” column of Table 2, must be added to the map before the relate can be built from it. The table listed in the “**To Attribute Table**” column need not be added to the map to build a relate to it. Additional relates other than those shown in Tables 1 and 2 are possible. Refer to the NHDPlus V2.1 User Guide for more information.

Table 2

From Feature Class	Relate Field	To Attribute Table	Relate Field	Name of Relate
NHDFlowline.shp	ComID	PlusFlow	FromComID	Flowline_Outflows
NHDFlowline.shp	ComID	PlusFlow	ToComID	Flowline_Inflows
NHDFlowline.shp	ComID	PlusFlowlineVAA	ComID	Flowline_VAA
NHDFlowline.shp	ComID	EROM_MA0001	ComID	Flowline_EROM_MA
NHDFlowline.shp	ComID	IncrPrecipMA.txt	FeatureID	Flowline_IncrPrecipMA
NHDFlowline.shp	ComID	CumDivPrecipMA.txt	ComID	Flowline_CumDivPrecipMA
NHDFlowline.shp	ComID	HeadwaterNodeAreas	ComID	Flowline_HWNNodeAreas
NHDLLine.shp	Fcode	NHDFcode	Fcode	Line_Fcode
NHDArea.shp	Fcode	NHDFcode	Fcode	Area_Fcode
NHDPoint.shp	Fcode	NHDFcode	Fcode	Point_Fcode
NHDWaterbody.shp	Fcode	NHDFcode	Fcode	Waterbody_Fcode
NHDFlowline.shp	Fcode	NHDFcode	Fcode	Flowline_Fcode
Catchment.shp	FeatureID	IncrTempMA.txt	FeatureID	Catshp_IncrTempMA
Catchment.shp	FeatureID	CumTotTempMA.txt	ComID	Catshp_CumTotTempMA
Catchment.shp	FeatureID	HeadwaterNodeAreas	ComID	Catshp_HWNNodeAreas
Catchment.shp	GridCode	featureidgridcode	GridCode	Catshp_FIDGridcode
cat (grid)	FeatureID	IncrTempMA.txt	FeatureID	Catgrid_IncrTempMA
cat (grid)	FeatureID	IncrPrecipMA.txt	FeatureID	Catgrid_IncrPrecipMA
cat (grid)	FeatureID	HeadwaterNodeAreas	ComID	Catgrid_HWNNodeAreas

The relates shown in Tables 1 and 2 may be useful as Joins rather than Relates. For example, 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 f 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 PlusFlowlineVAA.dbf, then use the StreamOrde attribute in the symbology menu.

- f. Build a join between NHDFlowline.shp and PlusFlowlineVAA.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  icon in item 2, navigate to the PlusFlowlineVAA.dbf file in \NHDPlus06\NHDPlusAttributes.
 - iii. Use the pulldown list in item 3 and select COMID.
 - iv. Click **OK**.

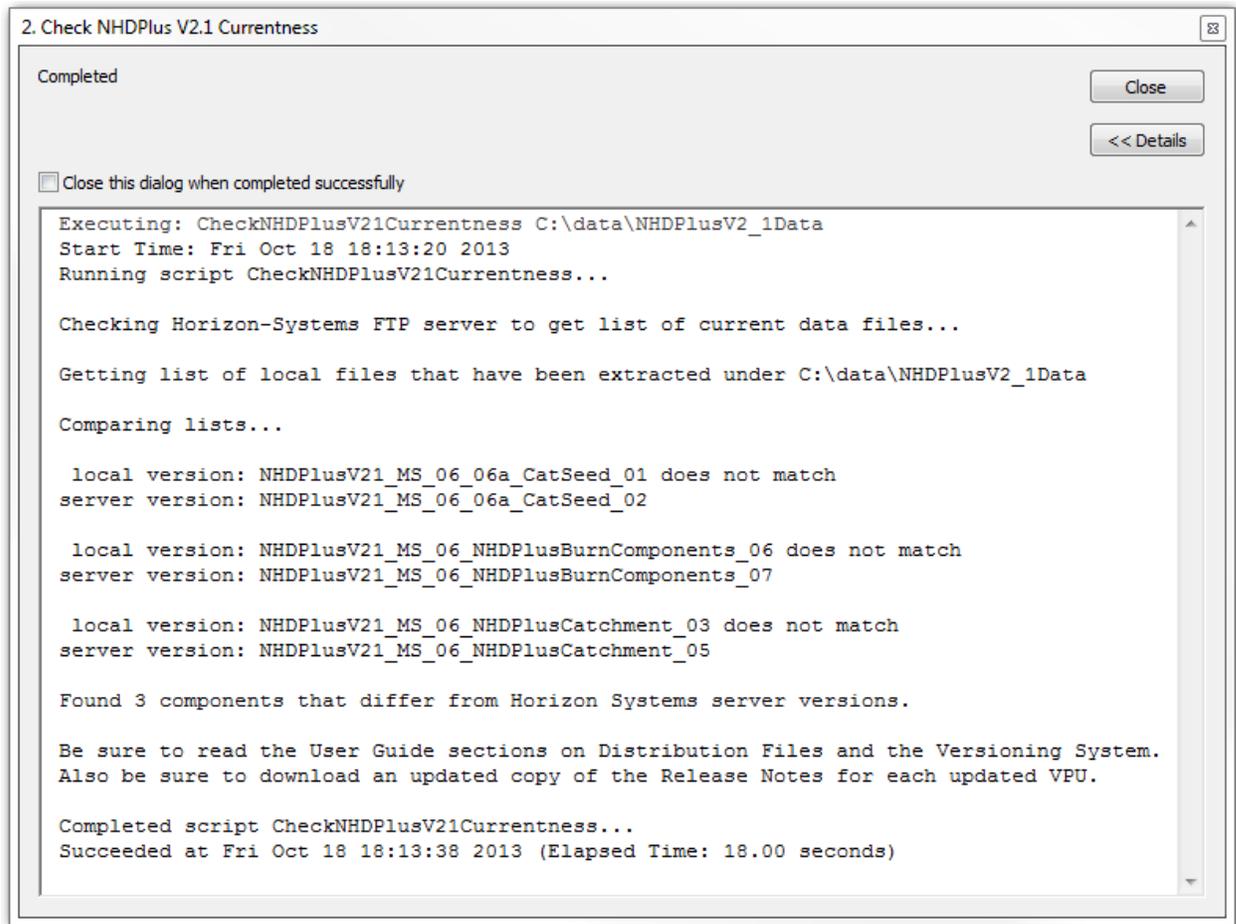


The fields from the joined table will now appear as fields available in the symbology menu, in queries, and in the NHDFlowline attribute table.

Part 3—Updating NHDPlus V2.1 Data Components

The data components of NHDPlus may be updated from time to time, if errors are discovered. A tool in the NHDPlus V2.1 Toolbox is provided to help users determine whether any data in their local collection has an update available. The following procedure may be used to check for updates, and to download and replace the updated components.

1. Start ArcCatalog.
2. Using ArcCatalog, navigate to the location in which you unpacked the NHDPlus V2.1 Toolbox in Exercise 0, or by following the User Guide section on Installing NHDPlus V2 Data. Double-click on the “**2. Check NHDPlus V2.1 Currentness**” tool, and use the browse tool to navigate to the top-level folder in which you have unpacked whatever NHDPlus V2.1 data you wish to check for updates. Click **OK**.
Note: If the dialog window disappears before you are finished reading it, then you likely have checked on the box labeled “Close this dialog when completed successfully” (see figure below). In that case, you can open the Results menu from the Geoprocessing pulldown on the main ArcCatalog menu, and find the results under “Current Session”. Expand the listing to see the messages that displayed in the dialog before it disappeared.
3. If you see a message “Your local NHDPlus V2.1 data are all up to date!”, then you are done.
4. If you see messages something like the ones shown below, you need to get some updates:



5. Go to <https://www.epa.gov/waterdata/nhdplus-national-hydrography-dataset-plus> and download the updated data files. In the above example, the files to get would be:

NHDPlusV21_MS_06_06a_CatSeed_02.7z
HDPlusV21_MS_06_NHDPlusBurnComponents_07.7z
NHDPlusV21_MS_06_NHDPlusCatchment_05.7z

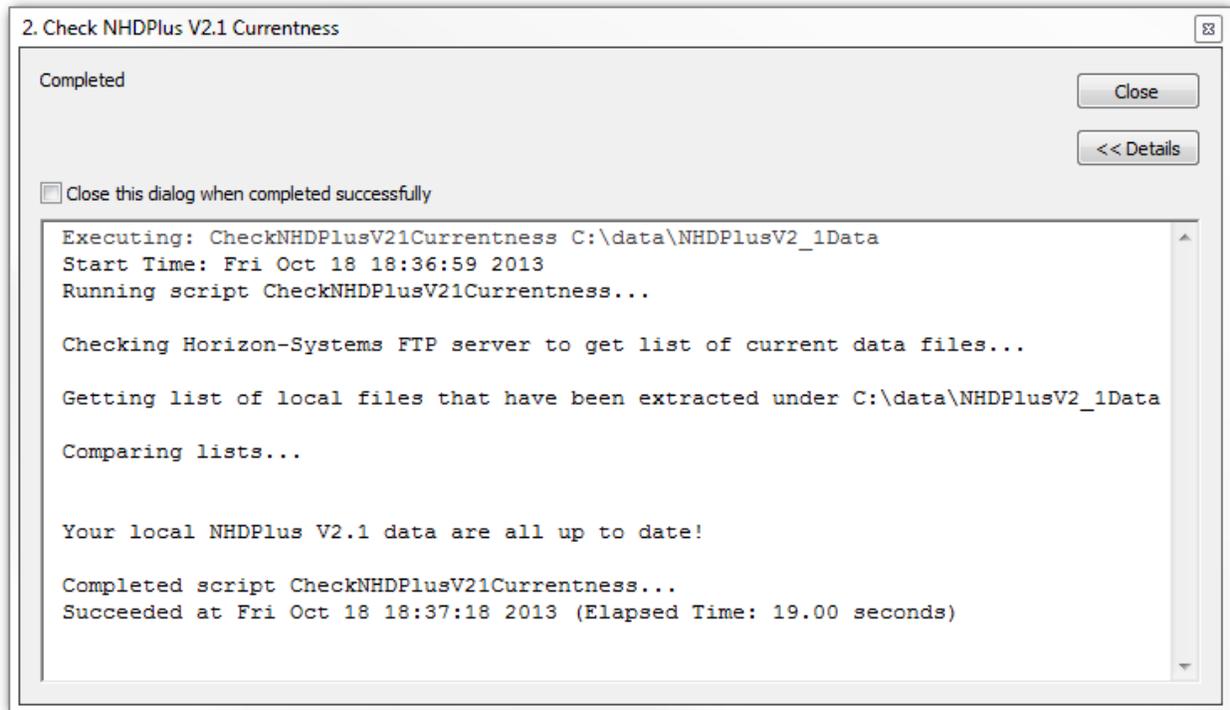
Place the downloaded files in the top level of your \NHDPlusV21Data folder, as described in the User Guide section on Installing NHDPlus V2 Data.

6. Check the **NHDPlusV2 Distribution Files and NHDPlusV2 Components** section of the User Guide to determine what folder(s) make up the updated components. Using your file browser or ArcCatalog, remove the entire folder(s) for those components. In the above example, the folders to remove are:

\NHDPlusV21Data\NHDPlusMS\NHDPlus06\NHDPlusCatSeed06a
\NHDPlusV21Data\NHDPlusMS\NHDPlus06\NHDPlusBurnComponents
\NHDPlusV21Data\NHDPlusMS\NHDPlus06\NHDPlusCatchment

Also download the Release Notes for any VPU that you downloaded updates for. In this example, you should download the **0release_notes_VPU06.pdf** file to the folder in which you store release notes. We suggest you store the release notes in your top-level \NHDPlusV21Data folder.

7. Install the NHDPlusV2 data that you downloaded in step 5. Instructions for data installation can be found in Exercise 0 and in the NHDPlusV2 User Guide.
8. Run the “**2. Check NHDPlus V2.1 Currentness**” tool again, as you did in Step 2 above. This time it should look like this:



9. You should now run the “1. Prep NHDPlus V2.1 Data” tool, as you did in Part 1 above, to rebuild indexes and raster pyramids. You can safely check the Build Raster Pyramids box, as it will only recreate pyramids for newly downloaded rasters.

The NHDPlusV2 User Guide sections on Installing Data, Distribution Files, and the Versioning System provide additional details on these topics.