



EXERCISE 2 –Appendix A

How does my data relate to the National Hydrography Database?

Introduction

This Appendix outlines Parts 2 and 3 of the Exercise 2 workflow for credentialed NHD Stewards who have access to the Hydrography Maintenance Portal and the NHD Update toolset. Part 1 of this workflow is covered in the Exercise 2 document.

Part 2: Obtaining the related NHD and WBD content

When preparing new hydrography data for an NHD update, **stewards and editors need to consider all of the existing core NHD content within their particular area of interest** (i.e. WBD extent). Even if users are only planning to update a particular component of the NHD (e.g. NHDFlowlines), the associated content within an Area of Interest (AOI) still needs to be considered to ensure that updated features meet topologic criteria, as well as ensure that unaltered NHD content is not inadvertently deleted from the production database during the update process. As an example, where stewards or editors are only interested in updating the NHDFlowlines layer, they must also consider and account for the existing NHDArea, NHDLine, NHDPoint and NHDWaterbody content – **failure to do so could result in existing valid content being deleted from the NHD**. To this end, the US Geological Survey (USGS) provides two websites, the Hydrography Maintenance Portal and the Hydrography Maintenance Training Portal, where credentialed stewards and users can create check-out replica databases that include all the current NHD and WBD content within an AOI. It is assumed in this exercise that anyone using the USGS **Hydrography Maintenance Training Portal** will have the required credentials in advance of the steps detailed below.

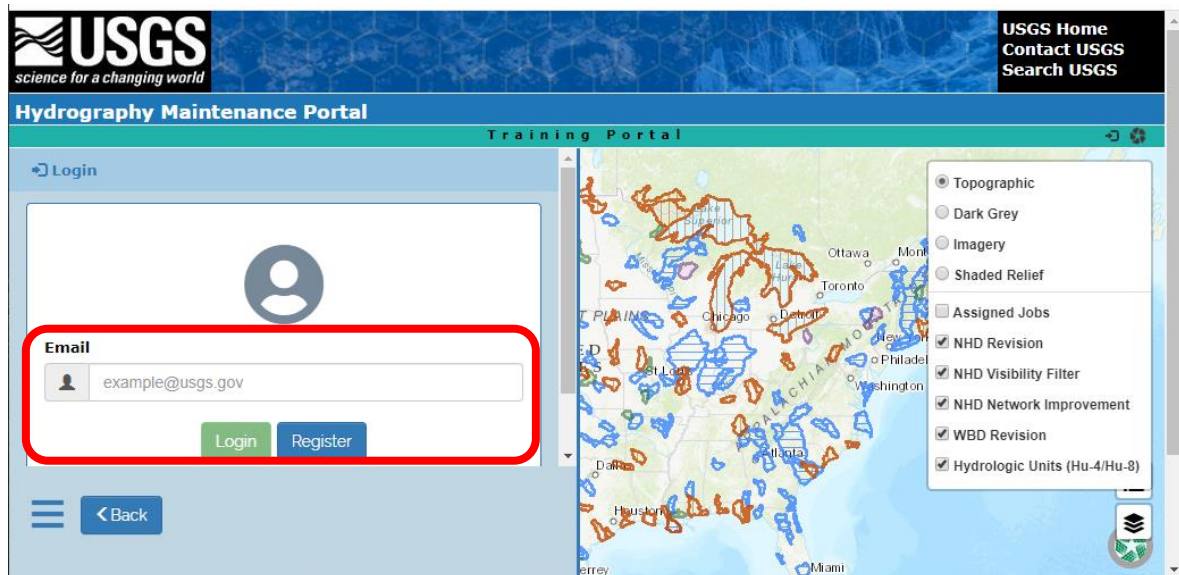
Note: The USGS's Hydrography Maintenance Training Portal requires that users first register for access to the website, as well as declare why they are requesting access to the transactional website. The registration process is directly available for all users of the site, https://hydromaintenance.nationalmap.gov/HMP_Training, but is not detailed within this exercise because it requires administrator permissions before credentials are granted. The approval process falls under the USGS purview and is out of scope for this exercise. Contact Joel Skalet within USGS Partner Support for detailed information about the Hydrography Maintenance Training Portal registration process - <https://www.usgs.gov/staff-profiles/joel-j-skalet>.

Note: This exercise will focus on the testing version of the Hydrography Maintenance Portal rather than the production version in order to avoid editing conflicts or negative impacts to the production data. However, the procedures detailed here are nearly identical to those required for use in an actual update process using the production version of the Hydrography Maintenance Portal.



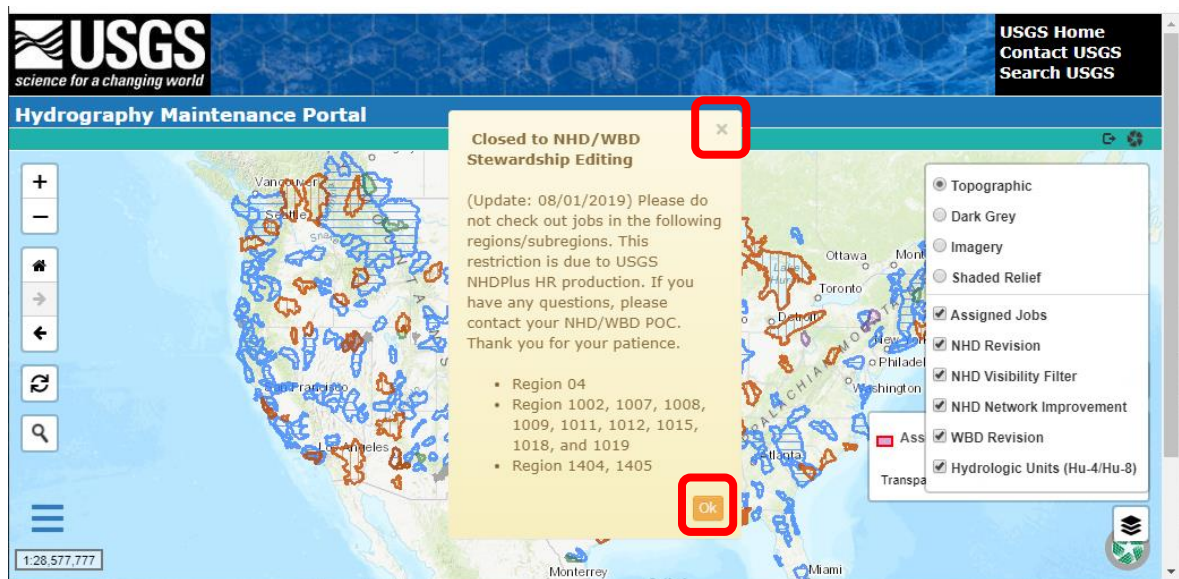
A. Create a checkout replica containing NHD data for the related AOI

1. In part one of the exercise we determined that the Streams_Subset dataset corresponds to the 1802012204 HU10 watershed and its parent, the **18020122** HU8 subbasin. Using that information, we can generate a checkout replica from the USGS Hydrography Maintenance Training Portal that will be used to supplement the data we're preparing for GeoConflation and subsequent NHD Update. Open a web browser on the computer and paste the following link into the address bar – https://hydromaintenance.nationalmap.gov/HMP_Training.



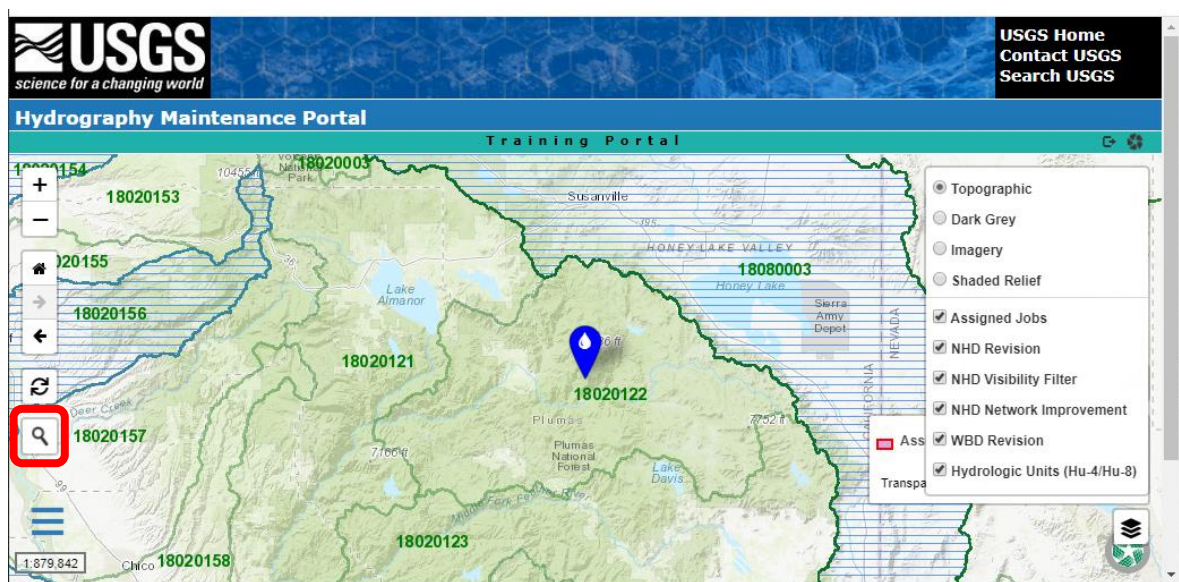
Note: The USGS allows users of the Hydrography Maintenance Training Portal to transact with NHD content on the basis of content defined by HU10 or HU8 watershed boundaries. Transactional checkout replicas can either be created on the basis of individual or adjoining HU8s; or on the basis of individual or adjoining HU10s. Depending on the WBD unit or units chosen to define a checkout replica, all of the NHD content that intersects the user defined area will be included in the checkout replica database.

2. Once on the Hydrography Maintenance Portal webpage, login using your USGS approved credentials. Upon logging in, read the automatic messages presented following login to ensure there are no potential conflicts with your area of interest, and then close any message windows as shown in the example below.

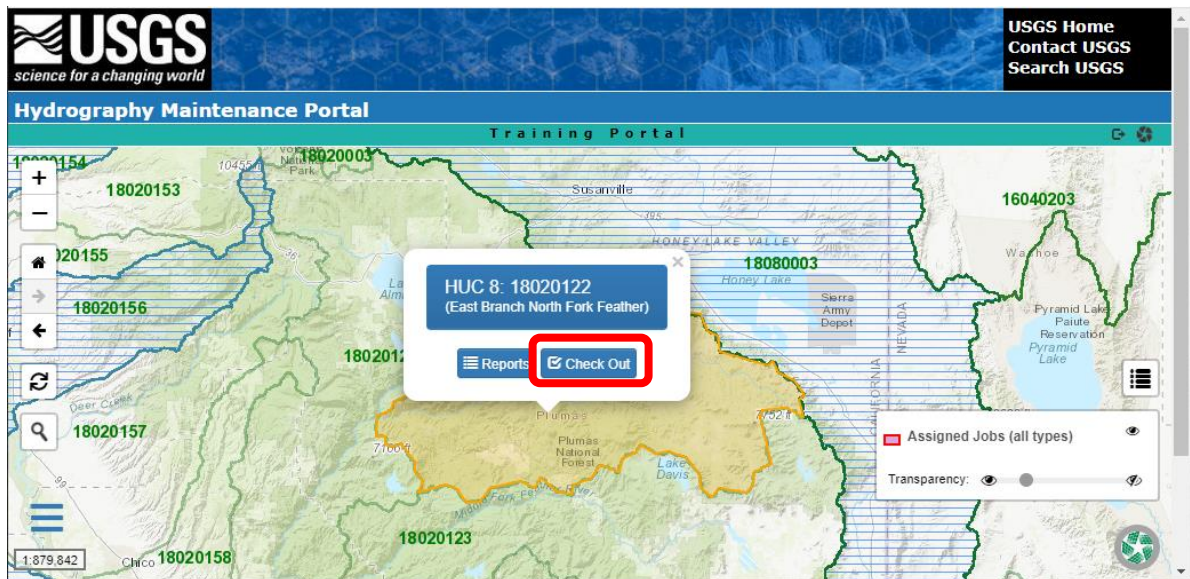


Note: In the example above, if there were any potential conflicts with our AOI, the first four digits of the corresponding HU8 would appear in the message – i.e., 1802. In this example, our AOI is not included of impacted by the current user alert.

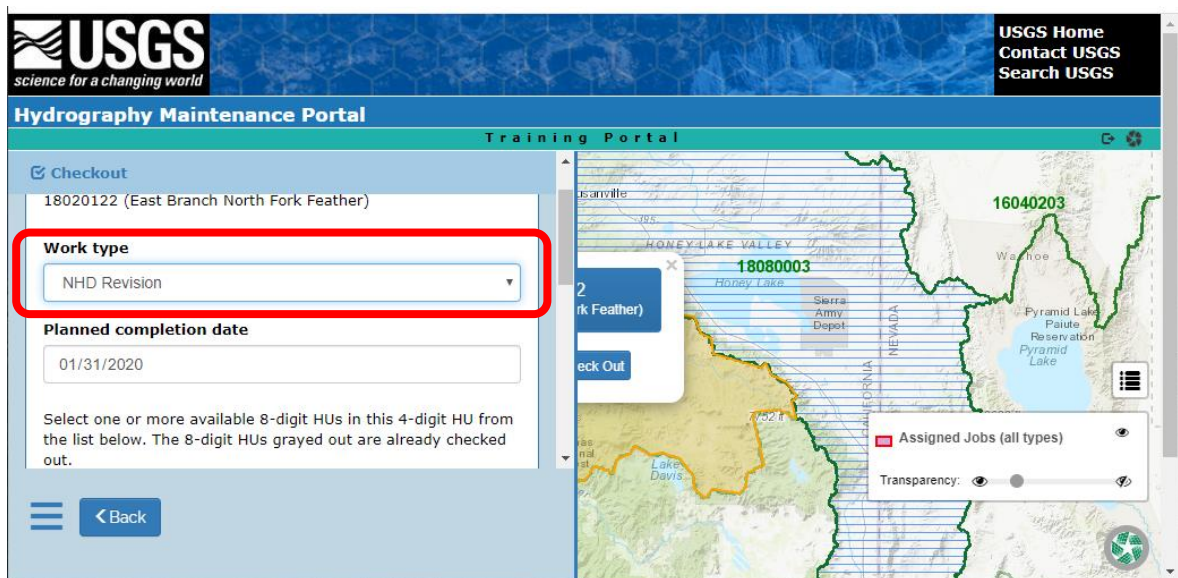
- Next, click on the magnifying glass on the left side of the interface. Type or paste the HU8 ID that corresponds with our AOI, **18020122**, and then hit the Enter key on your keyboard. The map will automatically zoom in and center on that HU8 boundary as shown below.



- Position your mouse cursor over the area labeled **18020122**, click once and then wait a moment (i.e., it can take a few seconds for the site to respond). The HU8 will change to an orange color and a pop-up dialog box will appear as shown below. Then click the button labeled as **“Check Out”**.



- Note that upon clicking **Check Out**, a dialog window then opens on the left side of the interface. Leave the default “NHD Revision” value in place for Work type parameter as shown below.



Note: In the production version of the Hydrography Maintenance Portal, users can select an additional Work Type option called “NHD Revision HU10” that is not available in the training version of the website. The NHD Revision HU10 would be applicable to this exercise if it were an available option (because our AOI is constrained to a single HU10), but since it’s not an option at this time, the process will describe interacting with an entire HU8 worth of data that is to be checked out via the Hydrography Maintenance Training Portal.

6. For this exercise users will advance the **“Planned completion date”** parameter by one day so that the system allows the transaction to take place. By default, the parameter is set to today’s date, so users of this exercise will need to change to value to tomorrows date in order to proceed with the checkout. Typically, users populate that parameter with an actual intended date of project completion, but for the purposes of this exercise (i.e. demonstration/practice only), advance the value by one day and scroll down to the **“Other 8-digit HUs...”** parameter.
7. Since our specific AOI is contained within this single HU8, 18020122, there is no need to check the box next to any of the adjoining HU8s. Make sure the **“Other 8-digit HUs...”** parameter is set as shown below and then scroll down to the **“Description of work...”** parameter.

Note: when checking jobs out for areas that are to be used for GeoConflation, stewards should confine check out jobs to a single HU8 at most. Due to how the GeoConflation tool handles ReachCode values, the tool will not be able to process jobs that span a HU8 boundary. The tool can process multiple HU10s or other subsets contained within a single HU8, but only so long as the subset is a single contiguous AOI and does not cross a HU8 boundary.

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Hydrography Maintenance Portal

Checkout

Select one or more available 8-digit HUs in this 4-digit HU from the list below. The 8-digit HUs grayed out are already checked out.

Other 8-digit HUs in the same 4-digit HU

<input type="checkbox"/> 0001	<input type="checkbox"/> 0002	<input type="checkbox"/> 0003	<input type="checkbox"/> 0004	<input type="checkbox"/> 0005	<input type="checkbox"/> 0104
<input type="checkbox"/> 0111	<input type="checkbox"/> 0115	<input type="checkbox"/> 0116	<input type="checkbox"/> 0121	<input checked="" type="checkbox"/> 0122	<input type="checkbox"/> 0123
<input type="checkbox"/> 0125	<input type="checkbox"/> 0126	<input type="checkbox"/> 0128	<input type="checkbox"/> 0129	<input type="checkbox"/> 0151	<input type="checkbox"/> 0152
<input type="checkbox"/> 0153	<input type="checkbox"/> 0154	<input type="checkbox"/> 0155	<input type="checkbox"/> 0156	<input type="checkbox"/> 0157	<input type="checkbox"/> 0158
<input type="checkbox"/> 0159	<input type="checkbox"/> 0161	<input type="checkbox"/> 0162	<input type="checkbox"/> 0163		

☐ Select all 8-digit HUs available in this 4-digit HU

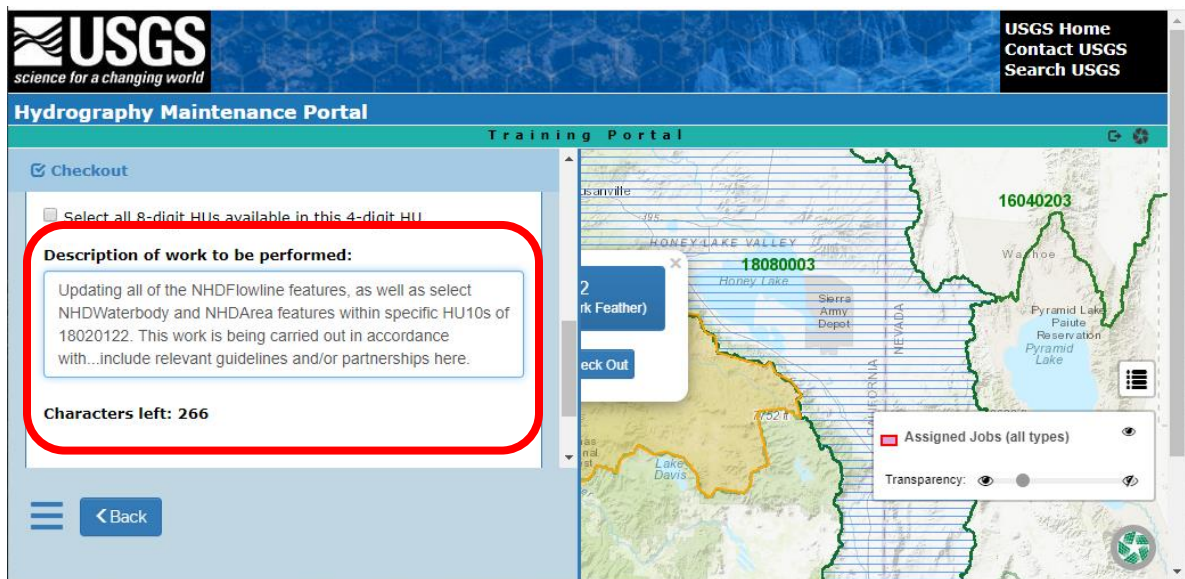
USGS Home
Contact USGS
Search USGS

Training Portal

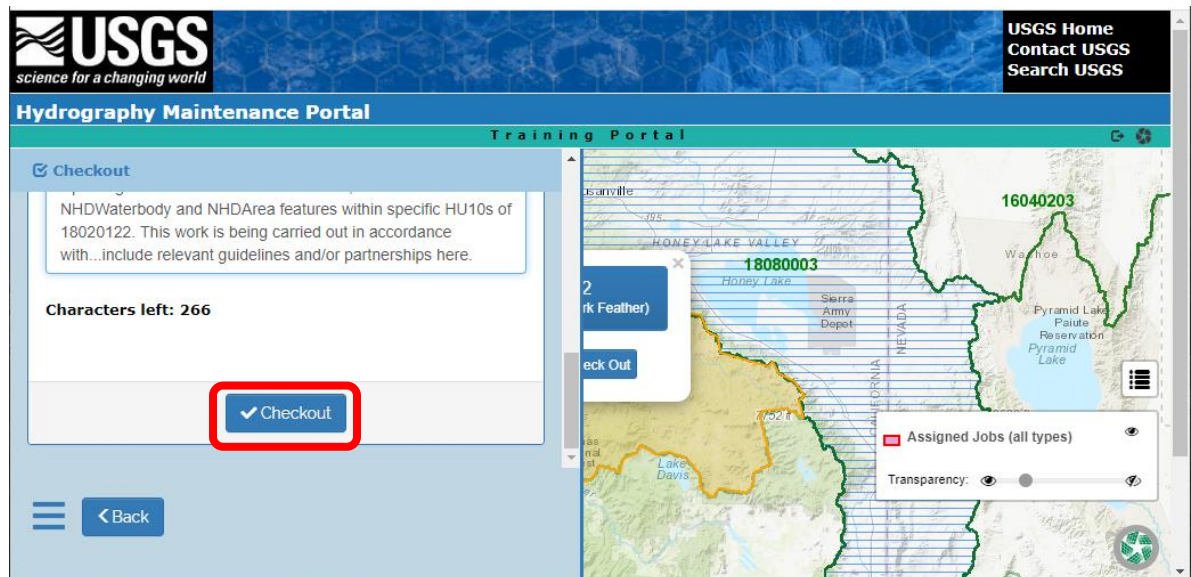
Assigned Jobs (all types)

Transparency:

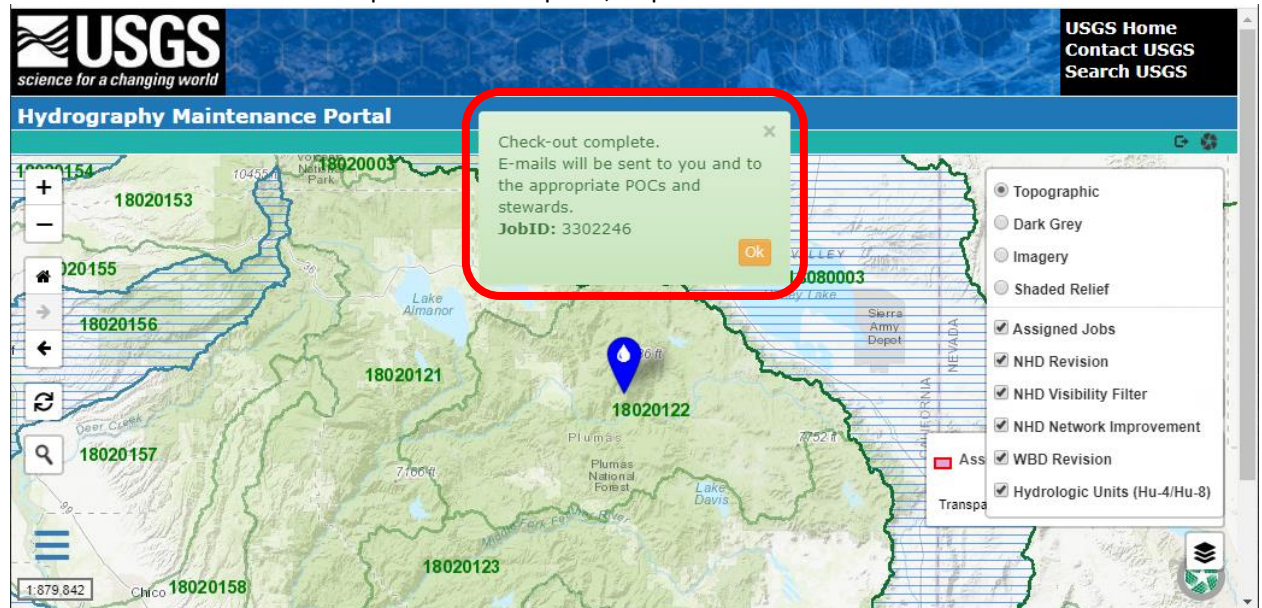
8. Within the **“Description of work...”** parameter, users are required to include a short abstract that describes of work being done as shown in the example below. Stewards should be aware that the information included in this parameter will be circulated, via automated email, to system administrators and possibly fellow NHD stewards within your state. As such, its important that users provide enough information to indicate what you’re intending to work on.



9. Next, once the “**Description of work...**” parameter has been populated, scroll down and click on the **Checkout** button at the bottom of the Checkout window. See screenshot below.



10. Upon clicking the Checkout button, a green message box will appear on screen which lets users know that the checkout process is complete, as per below.



11. Upon completion of the checkout process, you should receive an automated email (i.e., it will be sent to the credentialed user who initiated the checkout) from the address itxadmin@usgs.gov with the subject line "NHD Checkout Request Received". This first email acknowledges that the checkout process has been completed successfully and that the system is processing your checkout extent for subsequent retrieval. An example of the text in this initial notice looks like the following:

Thank you for your recent NHD checkout request. Your request is being processed as Job ID 3302246.

You will receive a follow up email when your Job is accessible through the NHD Geoedit "Job Menu"/"Get Job" utility.

4-digit HU/8-digit HU(s)/10-digit HU(s) included in this Job:
18020122

12. When the confirmation email for this checkout arrives (which can take up to a day depending on system traffic), it will be sent from wmxadmin@usgs.gov with a subject line saying "NHD Checkout Request Complete". This email indicates that the data is now ready for retrieval/download from the USGS. An example of the text in this subsequent notice looks like the following:

Job Checked-Out for NHD Revision 1/31/2020

Job ID [3302246] has been processed and is available for retrieval.
Your Job can be retrieved through the "Get Job" button on the NHD Update Toolbar.

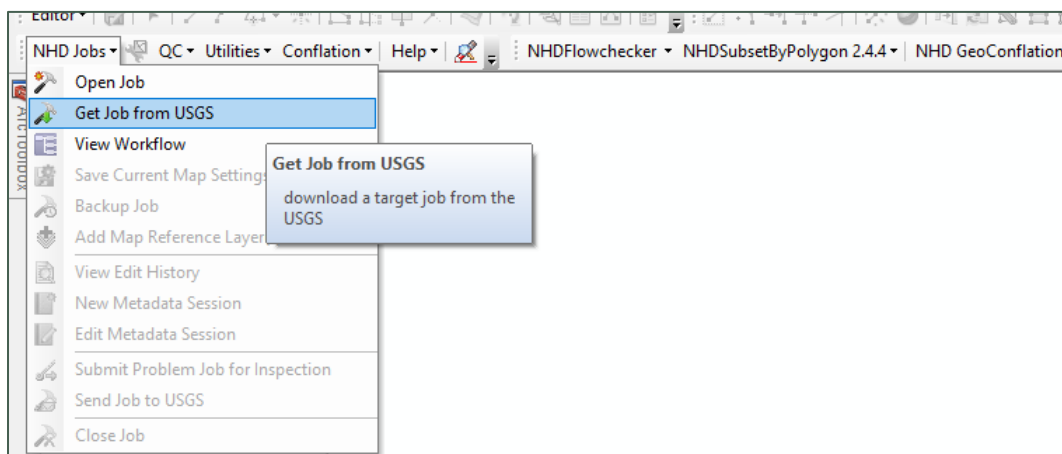
4-digit HU/8-digit HU(s)/10-digit HU(s) included in Job [3302246]:
18020122

13. Once the NHD Checkout Request Complete email has been received, users can then use the Job ID (**3302246** in this example) to populate the Get Job from USGS form (shown below) on the NHD Update toolbar within ArcMap.

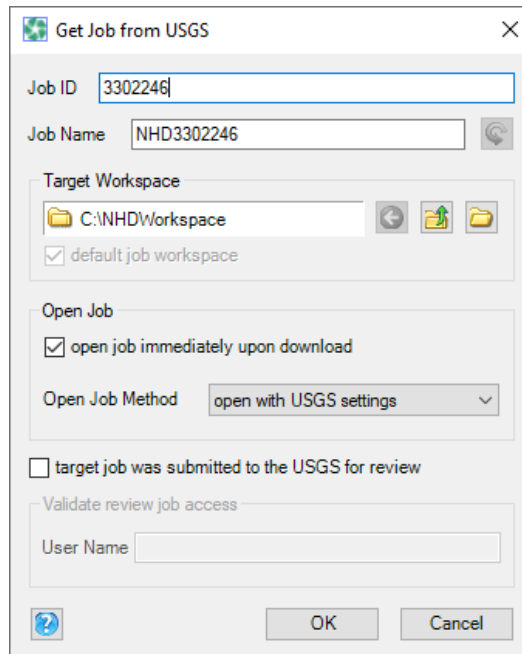
Note: Discussion of the NHD Update Toolbar and configuration of that toolset are out of scope for this exercise, and subsequently not discussed in this document. Information and documentation around that toolset is available from the USGS by contacting Joel Skalet within USGS Partner Support - <https://www.usgs.gov/staff-profiles/joel-j-skalet>.

B. Download the checkout replica

1. Open a new, 2nd instance of ArcMap – you may leave the original instance of ArcMap open that was used in Part 1 of the exercise as we'll be returning to that instance in Part 3 of the exercise. On the NHD Update Toolbar in the new instance of ArcMap, click on the NHD Jobs menu and select "**Get Job from USGS**" as shown below.



2. The "Get Job from USGS" form, allows users to download local copies of NHD production or NHD training data. It is assumed that users here will have the requisite NHD Update Tool installed and configured for use on their machines.



The 'Get Job from USGS' dialog box contains the following fields and options:

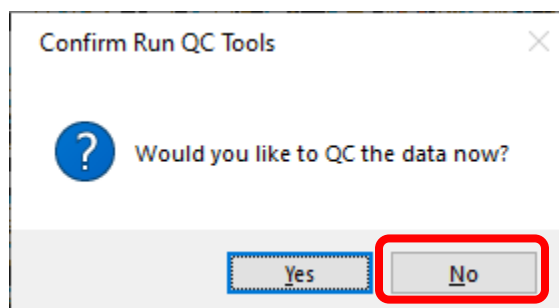
- Job ID:** 3302246
- Job Name:** NHD3302246
- Target Workspace:** C:\NHDWorkspace (with a checkbox for 'default job workspace' checked)
- Open Job:**
 - ☒ open job immediately upon download
 - Open Job Method:** open with USGS settings (dropdown menu)
- ☐ target job was submitted to the USGS for review
- Validate review job access:**
 - User Name:** (empty text field)

Buttons at the bottom: ? (help), OK, Cancel.

- When the Get Job window opens, paste the Job ID value from the email into the **JobID** parameter and notice that the **JobName** parameter auto populates with an associated value. Leave the remaining parameters set to default.
- Once the form has been populated with a valid Job ID and the “OK” button clicked, the tool will download the requested NHD data to a predetermined location on the user’s local machine. For the purposes of this exercise, we will assume that location to be the Exercise 2, Appendix A directory, and the resulting file geodatabase there is titled **NHD3302246.gdb**.

Note: for the purposes of this exercise, users will be expected to use the data supplied within the Exercise 2, Appendix A directory. Use of the data that was just downloaded is a closer simulation of how the process works in reality, but given that the data can change over time it is suggested that users adhere to the datasets supplied in order to avoid unforeseeable changes to the downloadable training data.

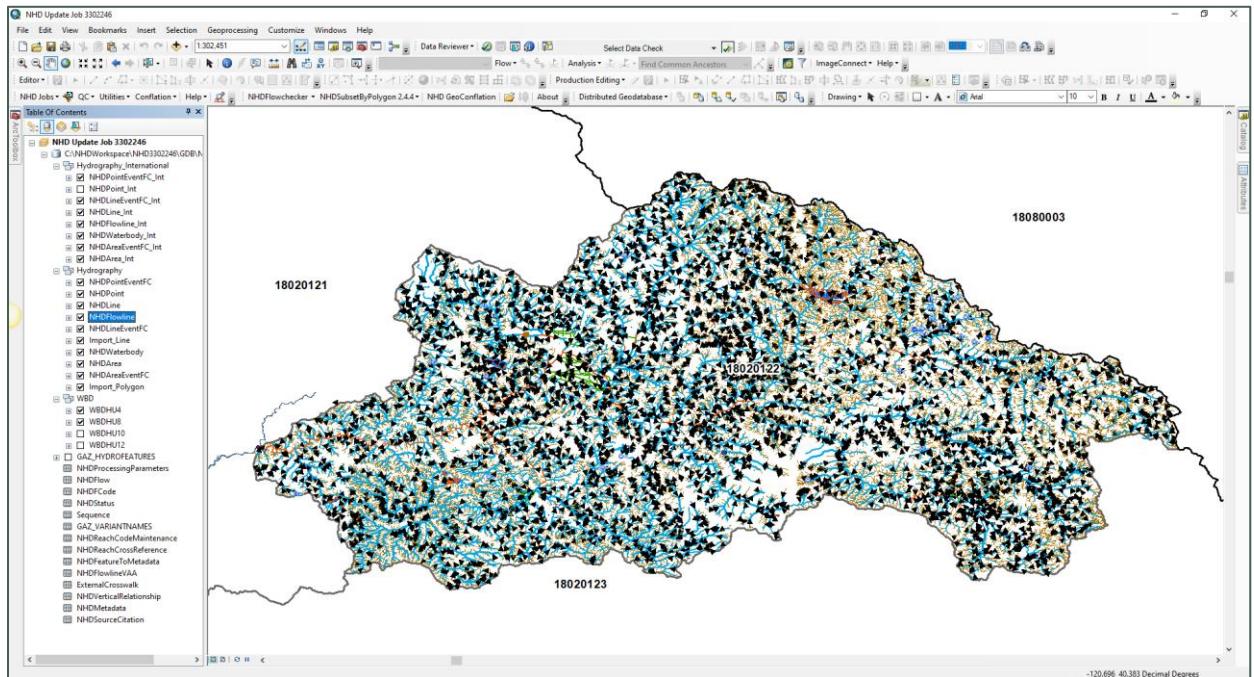
- Once downloaded from the USGS, all the NHD (training) data associated with HU8 18020122 will be displayed in your 2nd instance of ArcMap using default USGS symbology. A window should also be displayed asking “**Would you like to QC the data now**”. Select **No** as shown below.



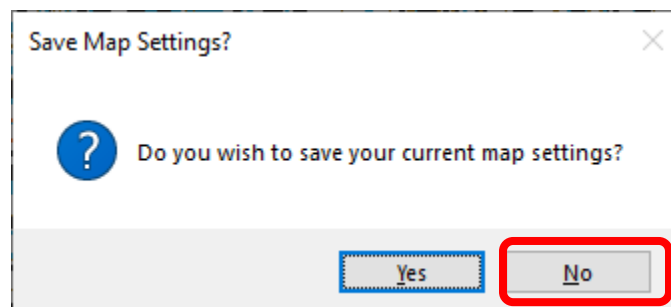
The 'Confirm Run QC Tools' dialog box contains the following:

- Title:** Confirm Run QC Tools
- Icon:** Question mark icon
- Text:** Would you like to QC the data now?
- Buttons:** Yes, No (The 'No' button is highlighted with a red rectangle).

- Upon closing the Confirm Run QC Tools window, the downloaded data within the 2nd instance of ArcMap should look like below.



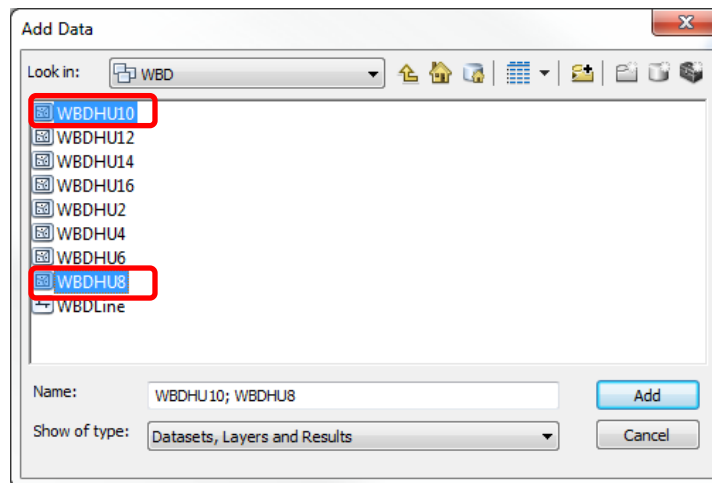
- You may now close the 2nd instance of ArcMap and proceed with the exercise using your original instance of ArcMap. Upon choosing to close ArcMap, a window will appear asking the user whether or not to save changes to the map document. Although, it makes no difference at this point in the exercise whether or not the map settings are saved (because they are all default settings), users should click on the **No** as shown below.



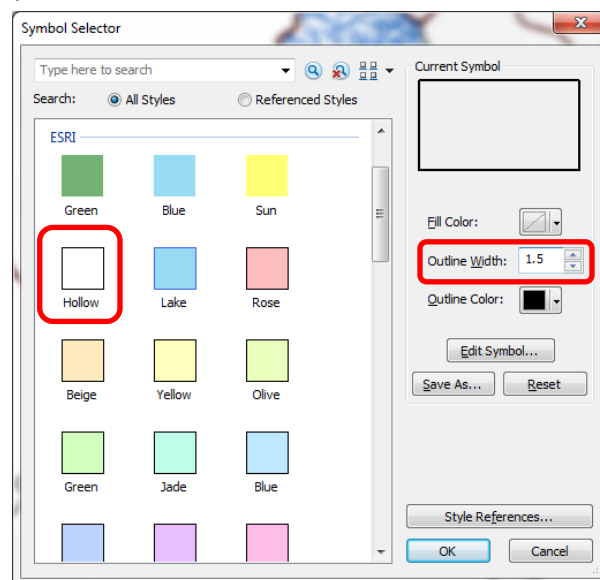
Note: it is the responsibility of any users of the USGS Hydrography Maintenance Training Portal, to “kill” (i.e. remove) any job checkouts that are no longer needed for training. Because this exercise and all subsequent exercises in this suite of documents has no further requirement for the now downloaded data to have any lineage stored within the USGS development environment, the job can be now safely killed. This is done by logging into the training portal, navigating to the area of the map that was checked out; clicking once on the checkout area; and selecting the red X next to the job ID. The process for killing jobs in both the production Hydrography Maintenance Portal and the training Hydrography Maintenance Portal are covered in the NHD Basics Training documentation available on the USGS Hydrography Data Community website or by contacting Joel Skalet within USGS Partner Support - <https://www.usgs.gov/staff-profiles/joel-j-skalet>.

C. Add the HU8 and HU10 features to ArcMap

1. In the original instance of ArcMap, click the **Add Data** button and navigate to the Exercise 2, Appendix A directory, and open the geodatabase titled **NHD3302246.gdb**. Within that geodatabase, open the WBD feature dataset by double clicking **WBD**.
2. Within the WBD feature dataset, while holding the **Ctrl** key, select **WBD10** and **WBD8**. Add the 2 selected datasets to the map.

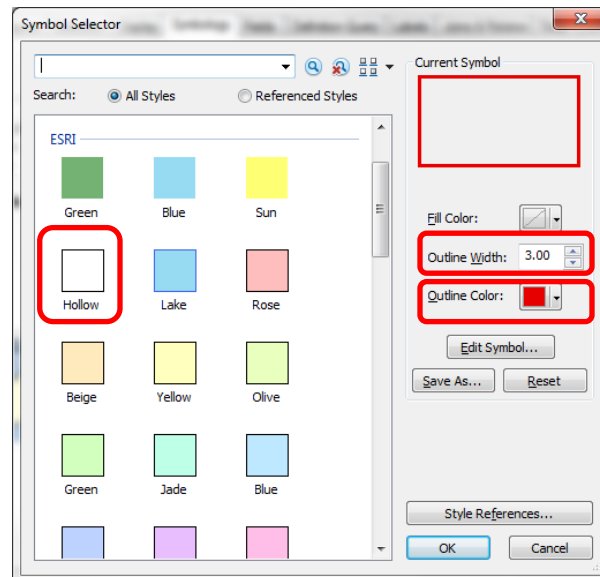


3. Right click on the **WBDHU10** layer in the TOC and select Properties.
4. In the Layer Properties dialog box, select the **Symbology** tab and confirm that features are being symbolized as **Features-Single Symbol**.
5. Next, click on the rectangle/polygon feature within the Layer Properties dialog box, choose the predefined Esri symbol titled **"Hollow"**, increase the **Outline Width** to **"1.5"**, and click **OK**.

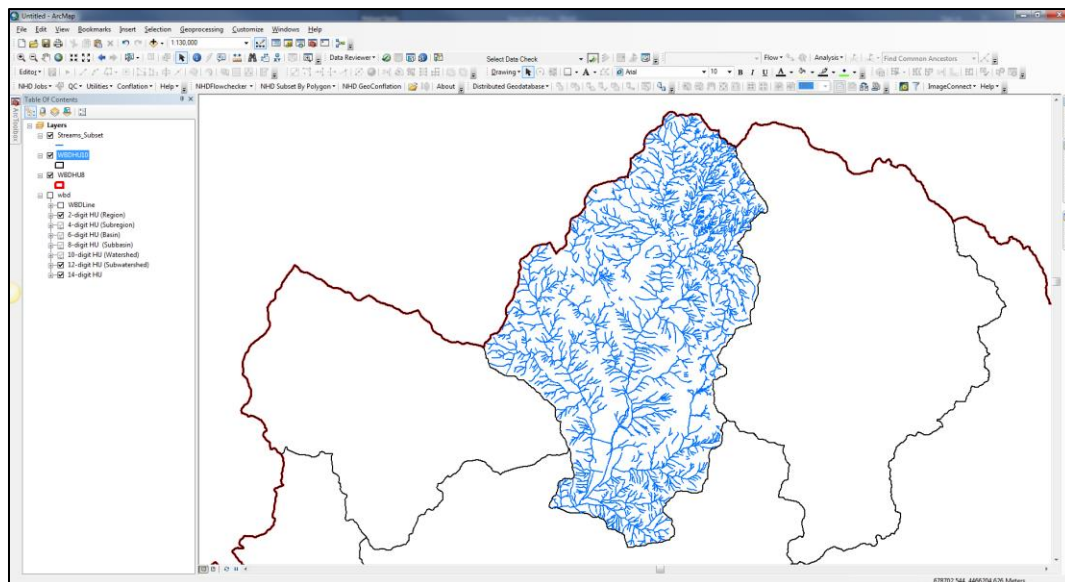


6. Next, right click on the **WBDHU8** layer in the TOC and select Properties.
7. In the Layer Properties dialog box, select the **Symbology** tab and confirm that features are being symbolized as **Features-Single Symbol**.

- Next, click on the rectangle/polygon feature within the Layer Properties dialog box, choose the predefined Esri symbol titled **"Hollow"**, increase the **Outline Width** to **"3"**, set the color to a shade of **Red**, and click **OK**.



- Turn on the WBD10 and WBD8 layers in the TOC. The resulting map should now contain the Streams_Subset layer shown in relation to the WBDHU10 and WBD8 and look similar to the example below.



- At this map scale (approx. 1:130,000), users should be able to see that the features within the **Streams_Subset** layer are largely confined to a single polygon within the HU10 boundaries. Similarly, if not more importantly, we can also see that the features within the **Streams_Subset** layer are largely confined to the single HU8 polygon in the map. These visual checks confirm the 2 following things:

- i. The HU10 boundary containing the stream features (1802012204 as identified in Part 1 above) will serve as a comprehensive AOI polygon for users to select and compare any related NHD content against the new stream features.
- ii. The stream features are also contained by the larger HU8 boundary (18020122), so there is no need to download additional NHD catchments from the USGS website for an NHD update involving the **Streams_Subset** dataset.

Note: *It is not uncommon for features like headwater streams or terminal downstream segments to cross watershed boundaries **within** a HU8; nor is it uncommon for more significant features such as large waterbodies or major rivers to cross actual HU8 boundaries. Because NHD update transactions use the principle of intersection for extracting a subset for update, users just need to be aware that they are also responsible for the maintenance of any features that may intersect their AOI and flow in from a neighboring waterbody. Uncontained features are not a concern for this exercise, but something to be aware of since users may notice features that meet the above criteria occurring in the next part below.*

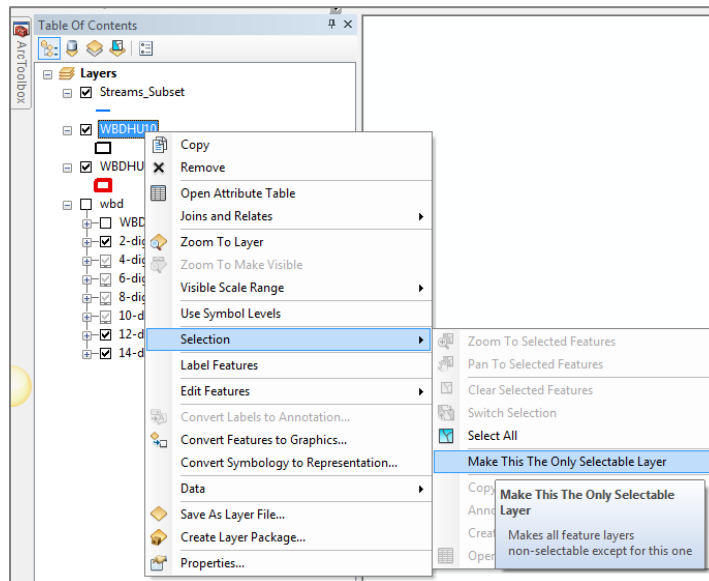
11. In the next/last part of this exercise, we will create a subset of the NHD that corresponds to the Streams_Subset feature for subsequent use when assessing the stream data for NHD update potential.


Part 3: Creating an NHD subset for later reference

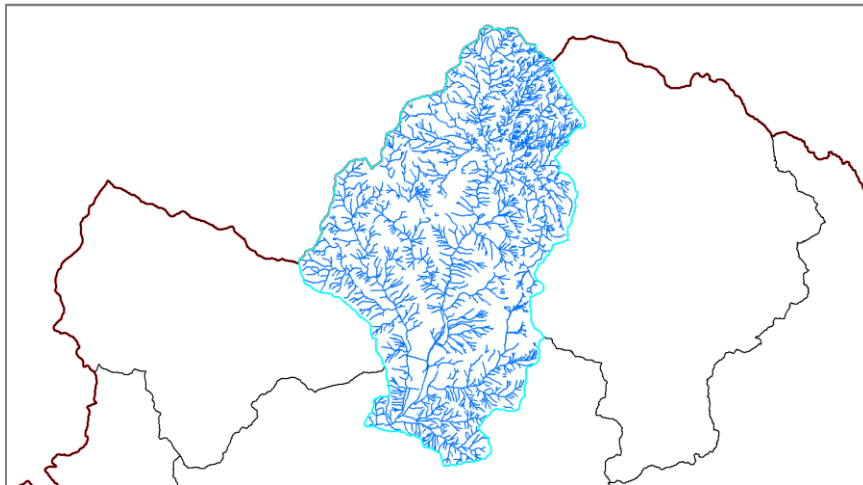
When preparing new hydrography data for an NHD update, stewards and editors need to consider all of the existing core NHD content within an update area to ensure that new data meets topologic criteria with respect to existing NHD content, as well ensure that no unaltered NHD content gets inadvertently deleted. In this part of the exercise, users will identify the subset of NHD content particular to the HU10 and take copies of those features for later use in the overall update process.

A. Extract the area of interest polygon from the WBD

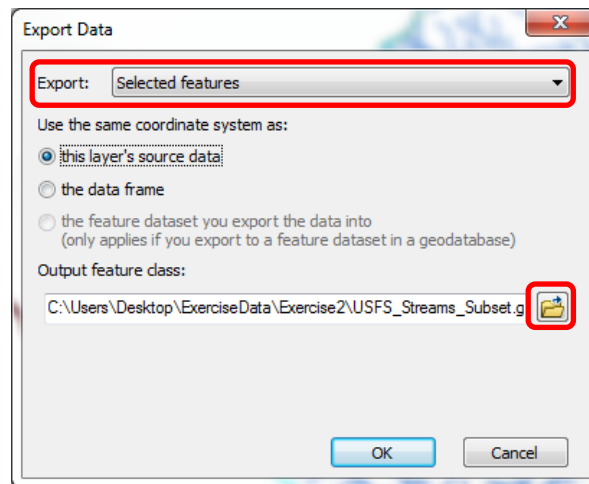
1. In the TOC, right click the **WBDHU10** layer, choose **Selection**, and then left click “**Make This the Only Selectable Layer**”.



2. Using the **Select Features** tool  on the **Tools** toolbar, left click once on the HU10 feature underlying the **Streams_Subset** features. Once selected, the boundary of the HU10 polygon will appear light blue as shown below.

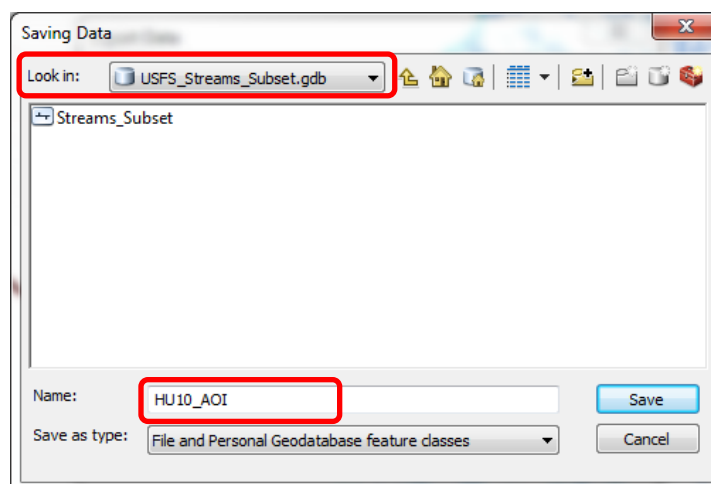


3. In the TOC, right click on the **WBDHU10** layer, choose **Data**, and then left click **Export Data**. When the resulting Export Data window opens, ensure that **Selected Features** is the option shown on the dropdown menu at the top of the menu as shown below.

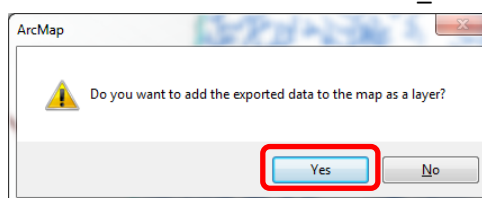


4. Next, using the folder icon on the Export Data window, navigate to the **USFS_Streams_Subset** file geodatabase, choose to name the saved content as **"HU10_AOI"**, click **Save** and then **OK**.

Note: You may need to change the **Save as Type** to **"File and Personal Geodatabase feature classes"** in order to see the **USFS_Streams_Subset.gdb** (see below image).



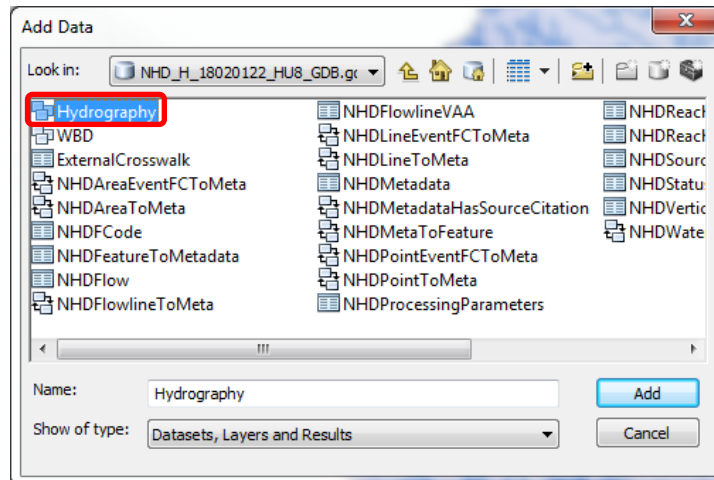
5. Once saved, ArcMap will present a window asking the user whether or not to add the newly created layer to the map. Choose **Yes** so that the new HU10_AOI feature is added to the map.



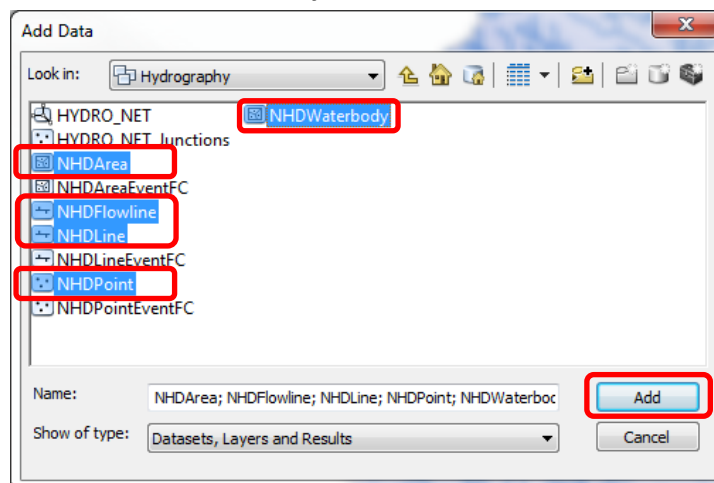
6. Whatever symbology ArcMap assigns to the new HU10_AOI layer when its added to the map document is okay – we're only concerned with the features extent from this point forward in the exercise. At this point we now have an AOI polygon saved that that can be used to determine which features from the exiting NHD need to be extracted for comparison against the **Streams_Subset** features.

B. Extracting NHD content that is coincident with an update area or an area of interest

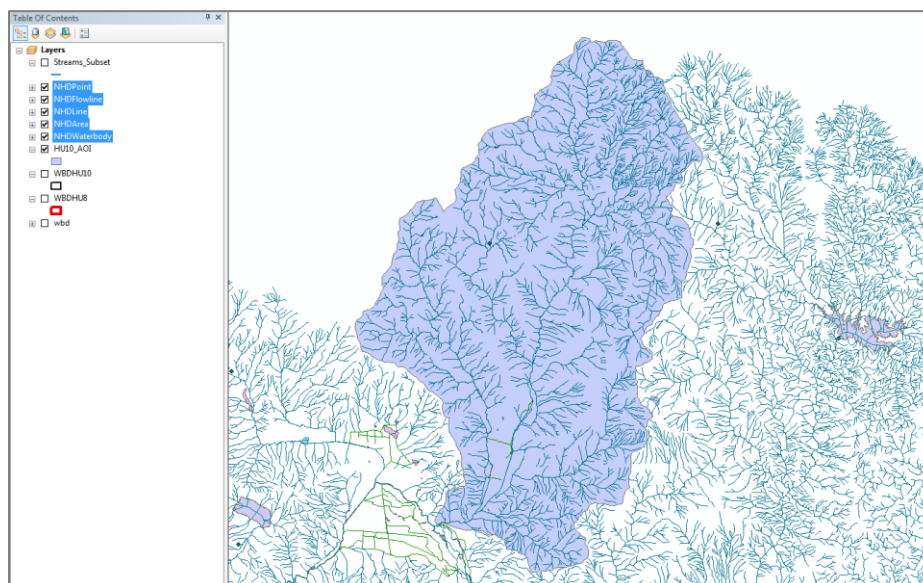
1. In ArcMap, click the **Add Data** button and navigate to file geodatabase titled **NHD3302246.gdb** within the Appendix A directory for this exercise. Within that geodatabase, open the NHD feature dataset named “Hydrography” as shown below.



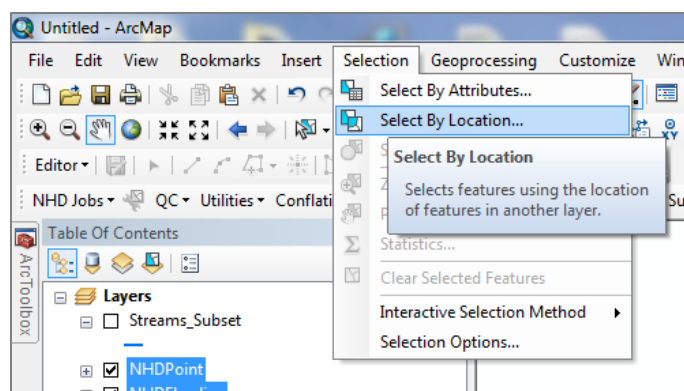
2. Within the NHD feature dataset, while holding the Ctrl key, select **NHDArea**, **NHDFlowline**, **NHDLine**, **NHDPoint**, and **NHDWaterbody**. Add the 5 selected datasets to the map.



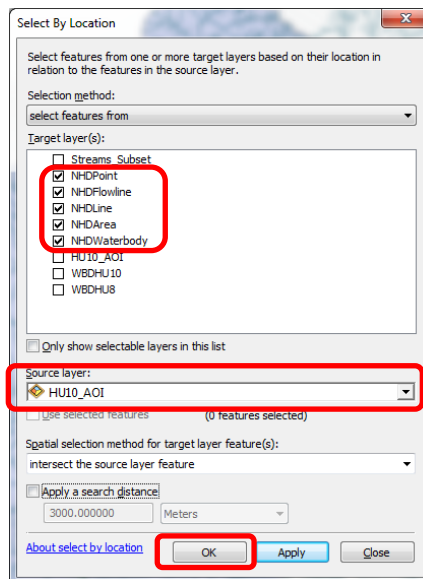
3. In the TOC, turn each of the newly added NHD layers on, however, compress each of the layers as shown below (click “-” symbol next to file name in TOC). Default map symbology is okay for each of the five NHD layers. Also, you may now turn off the **Streams_Subset**, **WBDHU10**, and **WBDHU8** layers in the TOC.



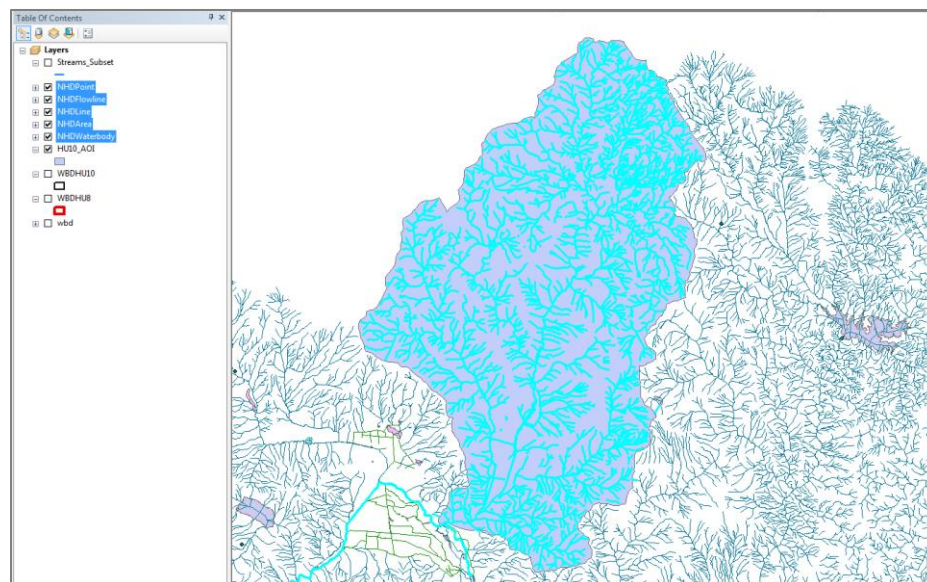
4. From the **Selection** menu at the top left of the ArcMap window, click **Select By Location**.



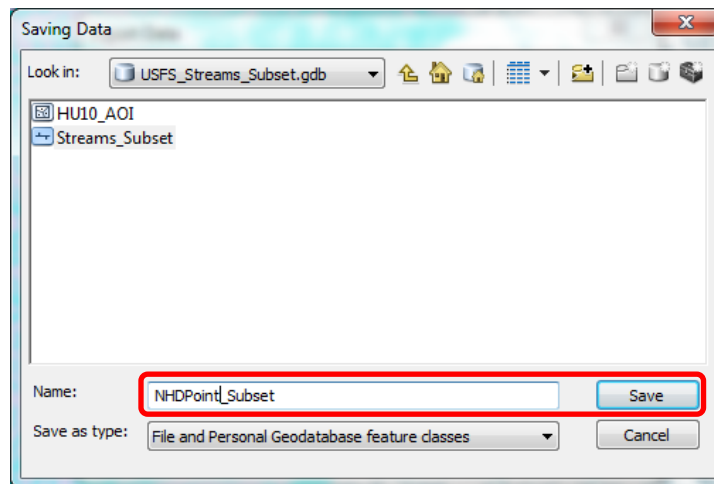
5. Within the **Select By Location** window, check the boxes next to the **NHDPoint**, **NHDFlowline**, **NHDLine**, **NHDArea**, and **NHDWaterbody** layers. From the Source layer dropdown menu, choose the **HU10_AOI** layer. Click **OK** once your Select By Location window matches the below image.



6. The results of the select by location process will now be highlighted in the map document.



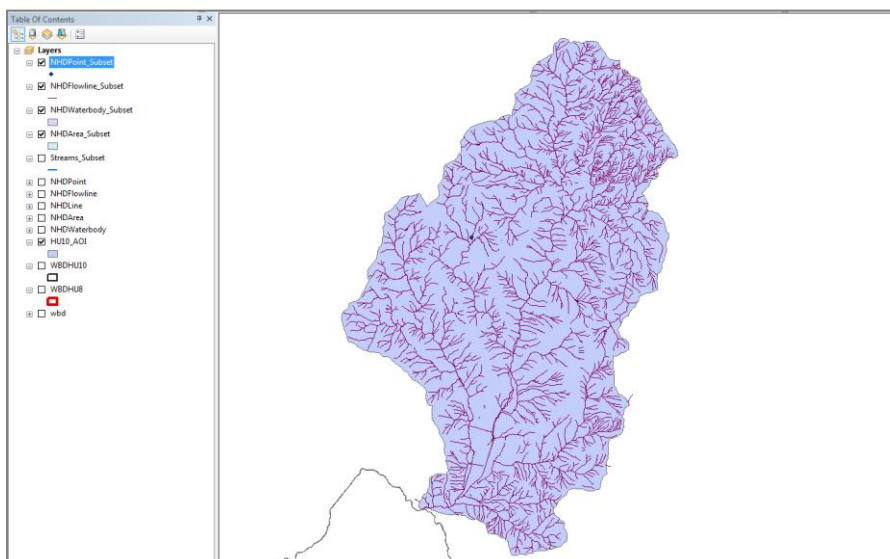
7. Each of the selected features in the map document are NHD features that the user will need to consider while preparing the Streams_Subset layer for eventual NHD update. With this in mind, copies of these features will now be saved for later assessment.
8. In the TOC, right click on the NHDPoint layer, choose **Data**, and then left click **Export Data**. When the resulting Export Data window opens, ensure that **"Selected Features"** is the option shown on the dropdown menu at the top of the menu.
9. Using the folder icon on the Export Data window, navigate to the **USFS_Streams_Subset** file geodatabase, choose to name the saved content as **"NHDPoint_subset"**, and click **Save**. Then click **OK** to export the data.



10. Click Yes when ArcMap asks whether you want to add the exported data to the map as a layer. The default symbology assigned to the newly added layer is okay and does not need to be modified at this point
11. All of the previously selected features should still be highlighted in the map. If they are not, then the user will need to repeat the **Select By Location** described in step 5 above. Assuming that all of the formerly selected NHD content is still highlighted in the map, users should repeat steps 8 through 10 above for each of the remaining NHD layers, except NHDLine (see note below). Assign each layer its original name followed by the suffix “_Subset”.

Note: users will not be able to export Selected Features from the NHDLine dataset in this exercise. Since there happens to be no NHDLine content within this particular AOI, none of the NHDLine features are selected in the map. As a result, users do not need to create a new layer titled “NHDLine_Subset” for this exercise.

12. When complete, users should have 4 newly added NHD_Subset layers visible within the TOC. Turn each of the newly added subset layers on in the TOC and turn off all 5 of the original NHD layers. The resulting map should now look similar to the example below.





13. The features identified and saved as new datasets throughout this exercise can now serve to inform users how the **Streams_Subset** layer needs to be further modified to bring into topologic conformity with NHD standard.
14. Users need not save the map at the conclusion of this exercise and may now close ArcMap without saving.

Congratulations! You have successfully completed this exercise and have been introduced to methods used for assessing how newly created hydrographic content relates to the existing NHD content. You have also learned how to capture related NHD content for subsequent assessment against NHD topologic requirements of data that will eventually be used to update the NHD.

