

Inventory & Monitoring Division

National Park Service



Standard Operating Procedure 2.11.10

Processing Source Data to Derive Landscape Dynamics Metrics: NHD High-resolution Source Data

Please cite this as:

Kinseth, M. and L. Nelson. 2018. Processing source data to derive landscape dynamics metrics: NHD high-resolution source data. Inventory & Monitoring Program Standard Operating Procedure NPS/NRSS/IMD/SOP—2.11.10. National Park Service, Fort Collins, Colorado.

Summary

Obtaining and processing National Hydrography Dataset High Resolution (NHDH) waterbodies data for use with Landscape Dynamics.

Contents

	Page
Summary	1
Overview	3
Processing Requirements	3
Pre-Processing.....	3
Step 1: Download NHDH Data	3
Processing	4
Step 1: Run NHDH for Area without Roads (Aw/oR) Tool	4
Step 2: Import Metadata	6
Dissemination	8
Step 1: Move Processed Data	8
Step 2: Publish to Data Store.....	8
Literature Cited	9
Appendix 1: Data Availability and Known issues	10
Data availability.....	10
Additional issues	10
Memory Issues	10

Overview

This SOP outlines how to collect, extract, and process NHD High Resolution (NHDH) data for use in Landscape Dynamics. This waterbody data is intended only for use with Landscape Dynamics Area without Roads summary statistics processing (SOP 3.11.4; Kinseth and Nelson 2018a). The data will be updated annually, concurrently with TIGER road data updates (SOP 2.11.13; Kinseth and Nelson 2018b).

It is assumed users of this SOP have prior knowledge of data paths, file locations, and repositories referenced in this SOP.

Processing Requirements

- Internet connection, sufficient storage for data download
- Zip file extract tool, sufficient storage for data processing
- ArcGIS
- Disc space and RAM available to process large files locally
- Write access to X: drive

Pre-Processing

Within the directory X:\ProjectData\LandscapeDynamics\SourceData\Hydrology\NHDH_Water

- Create a year-stamped file folder (YYYY) and within that folder create another folder called “National_NHD” for download of new NHD data

Note: TIGER Roads should be updated/downloaded at the same time as NHDH (SOP 2.11.13; Kinseth and Nelson 2018b).

Step 1: Download NHDH Data

1. From <http://prd-tnm.s3-website-us-west-2.amazonaws.com/?prefix=StagedProducts/Hydrography/NHD/National/HighResolution/GD> B/ download National level .zip file to X:\ProjectData\LandscapeDynamics\SourceData\Hydrology\NHDH_Water\YYYY\National_NHD. The download will take some time.
 - a. Also download: “National_NHD.xml”
 - b. If the above link does not work, go to <https://www.usgs.gov/core-science-systems/ngp/national-hydrography/access-national-hydrography-products> and find the NHD by the Entire Nation (High Resolution, National coverage) download from there.

- c. TIGER road data should be updated/downloaded concurrently with NHDH, see Post-Processing. If possible, NHDH source data publication should predate TIGER roads.
2. Edit Table 1 to reflect download information. The NHDH water data is routinely edited and updated by USGS. It is important to record the date of download and publication (last modified) accurately.
 - a. Edit “X:\ProjectData\LandscapeDynamics\SourceData\Hydrology_README.txt” and add the DATE OF DATA DOWNLOAD for new YYYY NHDH version.

Table 1. NHDH data download history tracking.

Year	Date of Publication (Modification)	Date of Download	Download Link
2010	N/A	N/A	N/A
2015	Unknown	20160413	ftp://nhdftp.usgs.gov/DataSets/Staged/SubRegions/FileGDB/HighResolution/
2016	Unknown	20161025	http://prd-tnm.s3-website-us-west-2.amazonaws.com/?prefix=StagedProducts/Hydrography/NHD/National/HighResolution/GDB/
2017	20170623	20171006	http://prd-tnm.s3-website-us-west-2.amazonaws.com/?prefix=StagedProducts/Hydrography/NHD/National/HighResolution/GDB/
2018	20180829	20180924	http://prd-tnm.s3-website-us-west-2.amazonaws.com/?prefix=StagedProducts/Hydrography/NHD/National/HighResolution/GDB/
2019	tbd	tbd	

Step 2: Extract NHDH Data

EXTRACT .zip file to

X:\ProjectData\LandscapeDynamics\SourceData\Hydrology\NHDH_Water\YYYY\National_NHD, then copy the data locally for processing.

Processing

With a local copy of the data, run the NHDH for Area without Roads (Aw/oR) Tool. The tool may take several hours to run. Outputs from this tool are intended for use only with the Landscape Dynamics Area without Roads summary statistics calculations.

Step 1: Run NHDH for Area without Roads (Aw/oR) Tool

Processing Summary: Union feature classes NHDAreas and NHDWaterbody; extract and re-project features by geography/geographic extent; place data into respective feature classes using defined spatial references (see further down).

1. Open NHD.py and edit the parameters of the script where needed (Table 1). Save any changes made.

```

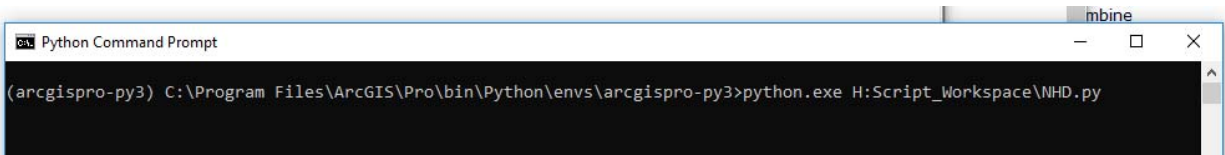
1 import arcpy
2 arcpy.ImportToolbox(r'J:\Script_Workspace\SourceProcessing.pyt')
3 arcpy.Source.NHD(r'J:\LD_Project_Workspace\NHD_2018\NHD_H_National_GDB.gdb',
r'J:\LD_Project_Workspace\LandscapeDynamics_Geographical_Boundaries.gdb',
r'J:\LD_Project_Workspace\NHD_2018','2018',
r'J:\LD_Project_Workspace\NHD_2018\NHD_H_National_GDB.xml');

```

Table 1: Tool parameters are defined as follows, in order of use:

Parameter	Notes
NHD Source GDB	The most recent downloaded and extracted geodatabase, National_NHD. Make sure to use a local copy.
Terrestrial Areas GDB	X:\ProjectData\LandscapeDynamics\SourceData\Boundary\LandscapeDynamics_Geographical_Boundaries.gdb
Output Folder	The local output folder
Data Year	Four digit year of data, YYYY
Source Metadata File (optional)	Path to download of YYYY .xml

2. Open the Python Command Prompt interface and run the NHD.py script. Be sure to use the Pro/py3 version.
 - a. Call python.exe and point to NHD.py.



3. When the tool finishes, visually check data for extent, correct spatial reference, and completeness.
 - a. Spatial References used (Table 2):

Table 2. Standard spatial references by processing extent

Processing Extent	Spatial Reference Name (datum)	Well-known ID (WKID)
North America (US, Canada, Mexico)	USA Contiguous Albers Equal Area Conic USGS (NAD83)	WKID: 102039
CONUS	USA Contiguous Albers Equal Area Conic USGS (NAD83)	WKID: 102039
Puerto Rico and USVI	USA Contiguous Albers Equal Area Conic USGS (NAD83)	WKID: 102039
Alaska	Alaska Albers Equal Area Conic (NAD83)	WKID: 3338
Hawaii	UTM Zone 5N (NAD83)	WKID: 26905
American Samoa	NAD_1983_HARN_UTM_Zone_2S (NAD83 HARN)	WKID: 2195
<i>Transform (if needed):</i>	WGS_1984_(ITRF00)_To_NAD_1983 + NAD_1983_HARN_To_WGS_1984_2	
Guam	WGS_1984_UTM_Zone_55N (WGS84)	WKID: 32655
<i>Transform (if needed):</i>	WGS_1984_(ITRF00)_To_NAD_1983	
CN Mariana Islands	WGS_1984_UTM_Zone_55N (WGS84)	WKID: 32655
<i>Transform (if needed):</i>	WGS_1984_(ITRF00)_To_NAD_1983	

Step 2: Import Metadata

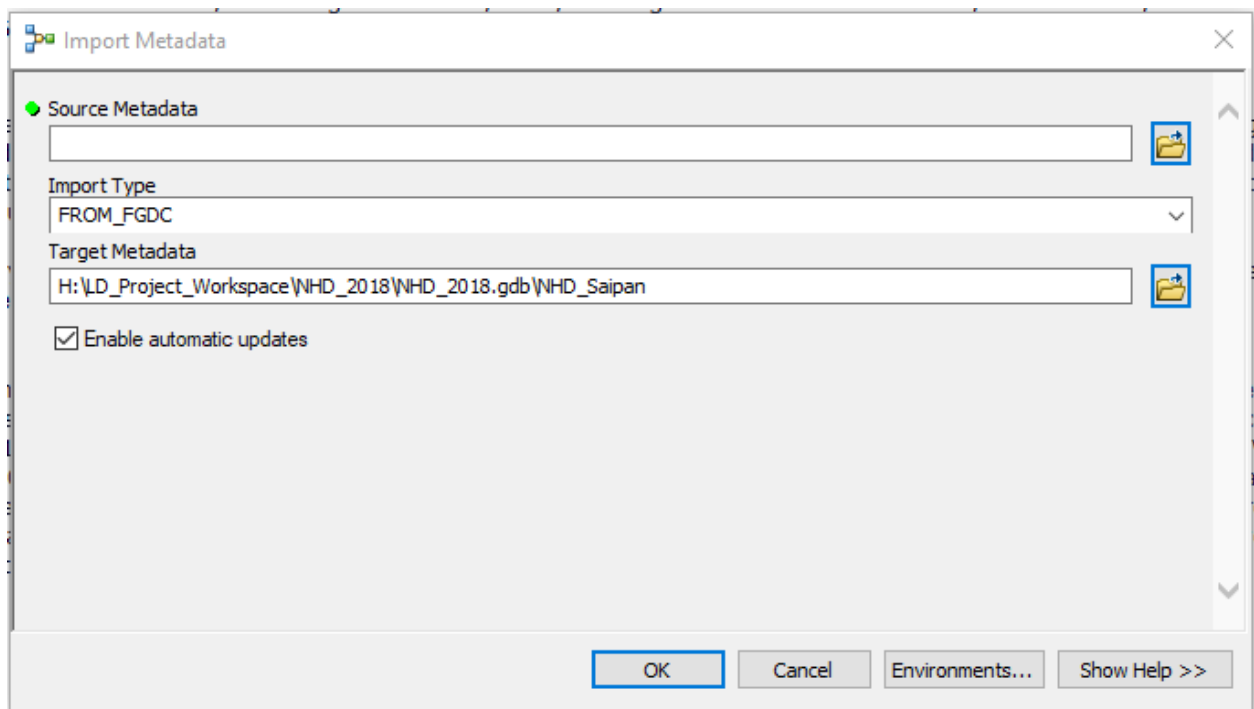
When the tool has finished, import metadata to each feature class.

1. Create a copy of the source xml, and edit.
 - a. Add to Summary and Description
 - i. “Data has been altered from the source. NHDArea and NHDWaterbody have been combined to create one layer representing water areas. This layer should only be used in conjunction with Landscape Dynamics.”
 - b. Add to existing text in Use limitations with the following:
 - i. Place at start: “Intended only for use with Landscape Dynamics Area without Roads statistics calculations.”
 - ii. Place at end: “The National Park Service shall not be held liable for improper or incorrect use of the data described and/or contained herein. These data and related graphics (i.e. GIF or JPG format files) are not legal documents and are not intended to be used as such. The information contained in these data is dynamic and may change over time. The data are not better than the original sources from which they were derived. It is the responsibility of the data user to use the data appropriately and consistent within the limitations of geospatial data in general and these data in particular. The related graphics

are intended to aid the data user in acquiring relevant data; it is not appropriate to use the related graphics as data. The National Park Service gives no warranty, expressed or implied, as to the accuracy, reliability, or completeness of these data. It is strongly recommended that these data are directly acquired from an NPS server and not indirectly through other sources which may have changed the data in some way. Although these data have been processed successfully on computer systems at the National Park Service, no warranty expressed or implied is made regarding the utility of the data on other systems for general or scientific purposes, nor shall the act of distribution constitute any such warranty. This disclaimer applies both to individual use of the data and aggregate use with other data.”

In ArcCatalog:

1. From Description, Import. Source Metadata is the edited xml.



Dissemination

Step 1: Move Processed Data

1. Move the downloaded .zip to
X:\ProjectData\LandscapeDynamics\SourceData\Hydrology\NHDH_Water\YYYY\National_NHD.
2. Move the processed output geodatabase from the local folder to
X:\ProjectData\LandscapeDynamics\SourceData\Hydrology\NHDH_Water\YYYY
3. If not already completed, Tiger Roads should be downloaded and processed (SOP 2.11.13; Kinseth and Nelson 2018b).

Step 2: Publish to Data Store

Go to Publishing to Data Store SOP (SOP 4.1.1; Kinseth and Nelson 2018c) and use the following information (Table 2) as a guide when uploading NHD Source data to Data Store.

1. From Environmental Settings Program,
<https://irma.nps.gov/DataStore/Reference/Profile/2244060>, go to Roads Project.
2. Compress the NHDH data into a .zip folder, by year.

NHDH_<YYYY>.zip

Table 2. Required upload parameters for holdings: Landscape Dynamics Source Data - Roads.

Parameter	Application
Date of Issue/Publication	Reference Level; Date of upload, update annually when new data is added
Description, Notes, Purpose	Reference Level; Make necessary edits to text in the reference for these two fields. Update years of data, reasons for new reference, etc, as needed.
Permissions	Reference/Holding Level; Public, all
Description	Holding Level; "National Hydrological Dataset High Resolution YYYY (File Geodatabase)"

3. Add external links to the source data (update url's as needed).
 - a. USGS (<https://www.usgs.gov/core-science-systems/ngp/national-hydrography/access-national-hydrography-products>)

Literature Cited

Environmental Systems Research Institute (ESRI). 2017. How To: Redirect where ArcInfo Workstation and/or ArcGIS writes temporary or scratch files during processing website. <http://support.esri.com/en/technical-article/000001418> (accessed 12/19/2017).

Kineth, M. and L. Nelson. 2018a. Calculating statistics for national landscape dynamics metrics: Area without roads. Inventory & Monitoring Program Standard Operating Procedure NPS/NRSS/IMD/SOP—3.11.4. National Park Service, Fort Collins, Colorado.

Kineth, M. and L. Nelson. 2018b. Processing source data to derive landscape dynamics metrics: Road source data. Inventory & Monitoring Program Standard Operating Procedure NPS/NRSS/IMD/SOP—2.11.13. National Park Service, Fort Collins, Colorado.

Kineth, M. and L. Nelson. 2018c. Publishing to Data Store. Inventory & Monitoring Division Standard Operating Procedure NPS/IMD/SOP—4.1.1. National Park Service, Fort Collins, Colorado.

Appendix 1: Data Availability and Known issues

Data availability

NHDH Data is updated by USGS throughout the calendar year. NHDH data, as intended for use with Landscape Dynamics, will be updated by Landscape Dynamics annually in conjunction with TIGER road data. Both data sets are accurate only to the date of publication (date last modified) on the date of download (see Table 1).

Additional issues

The current 2015 version of derived NHD was downloaded April 2016 and was also used in calculating summary statistics for 2010 Area without Roads. This version of NHDH was current as of the date of download, but will be referenced as 2015 NHD to coincide with 2015 TIGER Roads.

The NHDH dataset is dynamically updated throughout the year, and posted/published data is overwritten at various times through the year. The data in this SOP is only representative of NHDH waterbody status up to the date of publication (Table 1).

Memory Issues

If the NHDH tool fails due to an issue with memory, see ESRI (2017).

The following is extracted and modified slightly from the above-referenced article. User must have Admin privileges to accomplish these steps.

Use the following procedure to set an ARCTMPDIR system environment variable:

1. Navigate to Start > Control Panel > System and Security > System.
2. Select Advanced system settings, and click the Environment Variables button.
3. Under System variables, click the New button and enter the following:
variable name: ARCTMPDIR
variable value: *new drive location here* (for example, D:\temp)
4. Click OK on the New System Variable dialog box and click OK on the System Properties dialog box.
5. Restart ArcInfo or ArcGIS Desktop for this change to take effect.