

LANDFIRE Data Access Tool 2.8 User Guide

(November 2020 revision)

Introduction



LANDFIRE Data Access Tool (LFDAT) is an ArcGIS toolbar that allows users to interact with the LANDFIRE (LF) Data Distribution Site (DDS) and download LF products directly from ArcMap. Once the products are downloaded, the tool assists with preparing your LF data for analysis.

Users should be familiar with the operation of the LF DDS (<https://www.landfire.gov/viewer/>) prior to using this tool. The LF DDS provides a web browser interface where users can drag a box on a map to define an extent rectangle and download selected products as zipped files in either ESRI ArcGrid or GeoTIFF format. Also, depending on the size of the extent rectangle, the products may be separated into multiple tiles that will need to be merged back together by the user after download. LFDAT helps the ArcGIS user prepare their data for analysis in ArcMap.

LFDAT allows an ArcGIS user to define a download area by dragging a box in an ArcMap session to, select the desired LF products, and then download data from the LF DDS for the specified extent rectangle. All files should be downloaded to a single folder (e.g. `lfdat_in`). Please note that there can be no spaces in the file name. The downloaded zip files can be from any number of LF products, include single tile or multiple-tile downloads, and include products from any number of different spatial extent rectangles.



Once the data of interest are downloaded to a single folder, the LFDAT Smart Assembler can unzip and merges multiple datasets into a single output dataset with raster attributes tables attached into a new output folder (e.g. `lfdat_out`). Please note that this file name cannot have spaces. Optional outputs formats include ESRI ArcGrid, ERDAS IMAGINE, or GeoTIFF.

NOTE: Users should be aware that by using LFDAT they may be bypassing information found on both the landfire.gov and DDS websites. This includes important current information regarding products, updates, known issues, or other information critical to using LF products or LFDAT.

LFDAT users are strongly encouraged to consult the landfire.gov and LF DDS websites regularly to keep informed. The download and about windows in LFDAT contain hyperlinks to landfire.gov with important information regarding products and their status.

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System prerequisites

1. ArcGIS 10.3.x, 10.4.x, 10.5.x, 10.6.x, or 10.7.x
2. Microsoft .NET Framework 3.5 SP1 is an ESRI minimum system requirement for ArcGIS. However, later versions of the .NET framework (e.g. 4.5.2) can be installed and used for ArcGIS and LFDAT. The .NET framework must be installed prior to installing ArcGIS for Desktop. Computers with ArcGIS installed can be assumed to meet the .NET requirements for LFDAT.

Installation

LFDAT can be accessed on the LF website at <https://landfire.gov/datatool.php>. The installation package is a zip file containing a setup program with documentation. Please see the system prerequisites described above prior to installing LFDAT.

Installation should be done with administrator privileges on the local computer. Versions prior to 2.7 should be uninstalled prior to installing LFDAT 2.8. In version 2.0, uninstalling LFDAT previously removed any saved extent rectangles saved in an MDB file. To preserve the saved extents, make a backup copy of the Access database file named `LFDT_UserData.mdb`. Since version 2.1, the installation no longer removes this MDB file, which is found in one of the following directories:

- LFDAT 2.0 – in the program installation folder, `C:\Program Files\LANDFIRE Data Access Tool` by default.
- LFDAT 2.1 – in the All Users profile folder for application data, normally `C:\Documents and Settings\\Application Data\LANDFIRE Data Access Tool`
- LFDAT 2.2 to 2.x – in the user-specific profile folder for application data. Before version 2.5, this folder is specified by the `APPDATA` environment variable. In a command prompt window, type the word "set" without quotes and press Enter. Scroll up to the line that begins "`APPDATA=`". Since version 2.5, the previous steps are not needed. The directory location specified by `APPDATA` contains a subdirectory named `LFDAT` where `LFDT_UserData.mdb` is stored.

Close all ArcGIS programs, double-click the executable setup program (`setup.exe`) to install LFDAT. On the next launch of ArcMap there will be a new dockable toolbar available called "LANDFIRE Data Access Tool."

If the toolbar does not appear, activate it from the ArcMap main menu by clicking `View > Toolbars > LANDFIRE Data Access Tool`.

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After successfully installing LFDAT, previously saved extents can be restored if necessary, by replacing the LFDAT_UserData.mdb file with the backup copy referenced above.

Important Notes:

- LFDAT relies on configuration databases that store information about the LF DDS and products. Users are encouraged to update these configuration databases periodically using the Web Update feature. See Product Updates for more information on the update process.
- Since 2.7, there is no need to uninstall LFDAT when upgrading ArcGIS Desktop from version 10.3 to a later version.

LANDFIRE Data Access Tool Quick Start



Table 1: LFDAT Toolbar Functions

No.	Name	Function
1	LANDFIRE Map Zones	Command to add LF map zones for the CONUS, Alaska, or Hawaii.
2	Get LANDFIRE Data	Tool to drag an extent rectangle in ArcMap and download data from the LF DDS.
3	Extents	Dropdown of saved extent rectangles which can be reused for downloads.
4	Add A New Extent	Command to add a new saved extent rectangle by entering coordinates.
5	Smart Assembler	The LF Smart Assembler processes zipped LF products downloaded from the LF DDS. Specify an input folder containing the zip files and the LF Smart Assembler will unzip the files, name datasets, and merge multi-tile downloads if necessary. Output is written to a specified folder in either ArcGrid, ERDASIMAGINE, or GeoTIFF format.
6	Add LANDFIRE Data	Tool to add unzipped LF products with a LF colormap as a layer in the ArcMap Table of Content (TOC).
7	Raster Utilities	Raster Utilities: Build LCP File, LCP to ArcGrids, Attach DBF to ArcGrid VAT, and ArcGIS Project Raster.
8	About LFDAT	Provides information about LFDAT and web updates.

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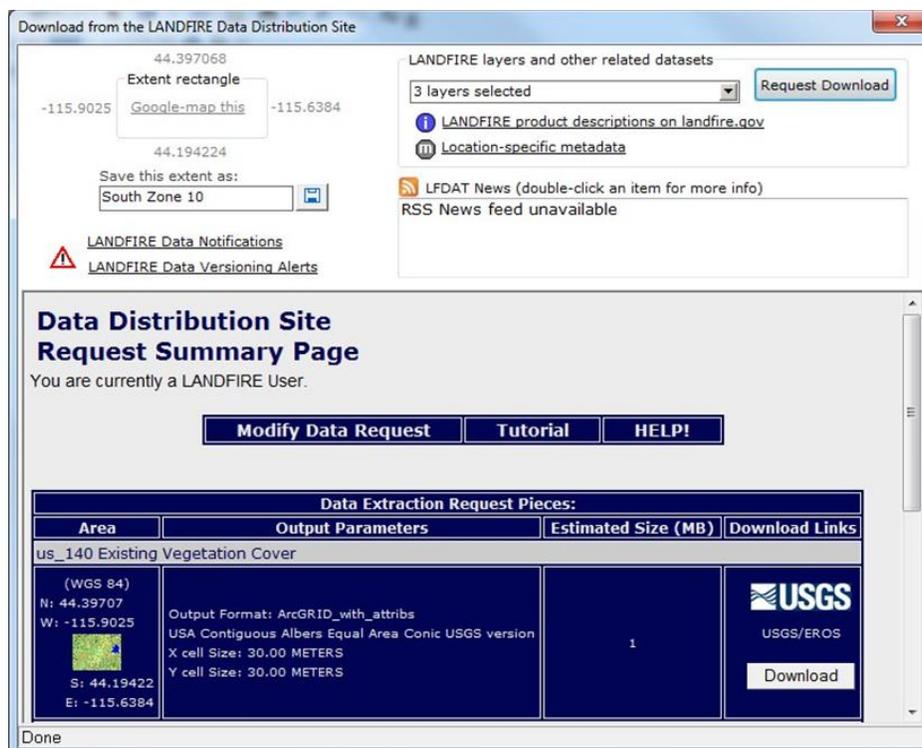
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Detailed Usage Instructions



LFDAT generally involves four steps:

1. Verify LF products are available from the LF DDS for the area of interest. From the About Tool, look for the link to “LANDFIRE Data Status”. Next, add the LF map zones from the drop-down list (button 1) to add a polygon layer to ArcMap for CONUS, Alaska, or Hawaii.
2. Define an extent rectangle and download LF products.
 - First, add any additional layers in ArcMap that help define an area of interest. Selecting the Get LANDFIRE Data button (reference #2) will activate a tool to draw a rectangle box in ArcMap. The box defines the download extent. When the mouse button is released, a form opens which allows the user to download LF products from the LF DDS:



- The coordinates of the current extent rectangle are shown in the upper left corner of the download form. The extent rectangle can be saved by typing a

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name up to 30 characters long in the box labeled “Save this extent as:” then clicking the save button next to the text box. After saving an extent rectangle, its name will appear in the “Extents:” dropdown list on the main toolbar (button 3). Saved extents can be reused to perform additional downloads with the same coordinates. In addition, the current extent rectangle can be displayed on a Google Map using the hyperlink labeled “Google-map this.”

- In the top right portion of the download form, a LF product can be selected from the “LANDFIRE layers and other related datasets” dropdown list. After a product is selected, the  link becomes active. Clicking on this button opens a web browser with the metadata associated with the selected product.
- Clicking “Request Download” button submits a download request to the LF DDS. Results are returned inside the form window and include download links of the zipped data files for the selected product. All downloaded zip files should be saved into a single folder (e.g `lfdat_in`). This folder should contain only zipped LF products from the LF DDS and the folder name should have no spaces. The zip files should not be renamed, and any number of zip files for any number of products or extent rectangles can be saved in the same folder. The Smart Assembler tool will batch process all zip files in the folder.

3. Batch process the downloaded zip files.

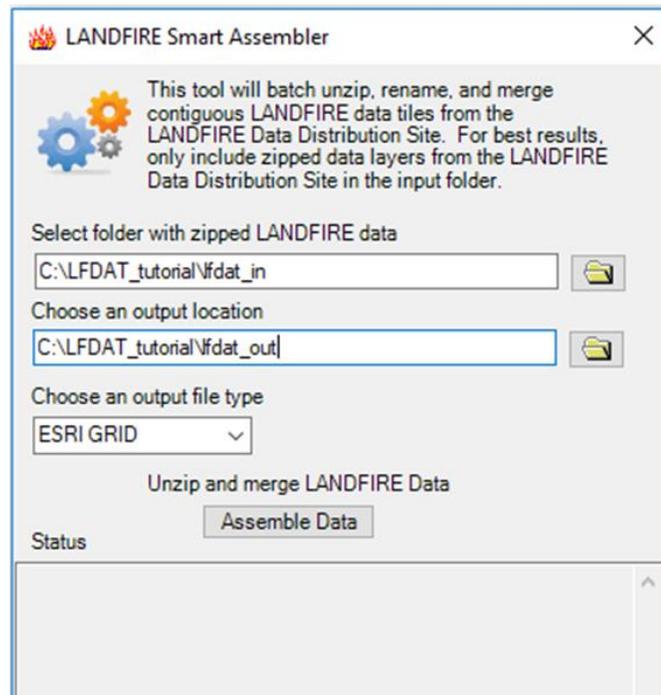
- Button 5  opens the Smart Assembler. This tool automates the assembly of downloaded LF zip files into usable raster formats and will handle any arbitrary collection of zipped products files from the LF DDS. The input folder should contain only LF zip files. The output location should have ample disk space to hold the uncompressed output raster files, plus additional temporary space for processing. Output rasters can be in ArcGRID, ERDAS IMAGINE, or GeoTIFF format.

NOTE: *This version of the Smart Assembler does not process vector data. Vector products downloaded from the LF DDS will need to be processed manually by the user.*

- Clicking the “Process and Assemble LANDFIRE data” button begins the following sequence of processing steps:

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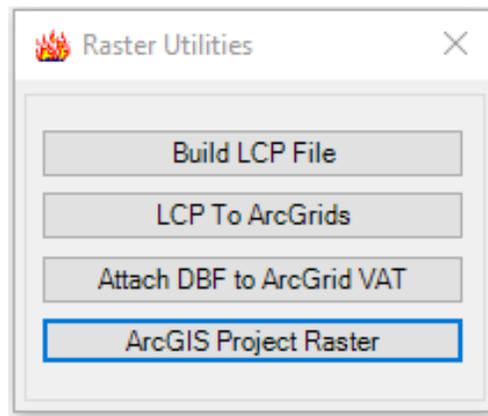
- a. Zip files are extracted to a temporary subfolder under the specified output folder.
- b. The metadata for each input raster tile is read to obtain the name and the spatial extent of the tile.
- c. Attributes are read from each tile input to obtain a master lookup table of attributes for each product.
- d. If multiple raster tiles exist for a product, an algorithm is used to determine which tiles belong in a contiguous spatial extent rectangle.
- e. A multiple-tile product is merged into a single output raster.
- f. Output rasters are renamed to descriptive LF names.
- g. Attributes are reattached to outputs and written to a *.dbf file.
- h. Original metadata from each input raster tile is copied to a metadata subfolder of the output folder, grouped by LF product.
- i. A log file of processing steps is written in the output folder.
- j. Temporary files are deleted when the Smart Assembler tool is closed.
- k. **Known issue:** *There are currently known issues with the Smart Assembler feature that can sometimes cause assembly to get stuck or falsely claim that assembly is complete (when it is not). These issues are being worked on. Always check your zip files to ensure that the DDS download worked properly, this may help with troubleshooting.*

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4. Add LANDFIRE data to ArcMap.
 - Button 6  works like the standard ArcMap “Add Data” button, but it is customized for adding a LF raster with a LF colormap. The “Add LANDIRE Data” button will prompt the user after selecting a LF raster to select the appropriate field to use as a label in the legend and on the TOC.

Raster Utilities



Button 7  opens the Raster Utilities toolkit:

Build LCP File

This utility builds a FARSITE v.4 landscape (LCP) file from a set of input LF rasters. It supports specification of the output LCP extent by matching an existing extent or by graphically drawing a rectangle on the display

LCP to ArcGrids

This utility disassembles a FARSITE LCP file into its individual LF raster outputs in ArcGrid format. It supports assignment of a coordinate system to the output grids.

Known issue: *The coordinate system assignment does not work correctly at this time. This issue will be addressed in a future version.*

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Attach DBF to ArcGrid VAT (DBF2VAT)

DBF2VAT accepts an input ArcGrid and a corresponding attribute table in *.dbf format. The tool joins the attributes included in the *.dbf file to the Value Attribute Table (.vat) of the GRID. A field named Value must be present in the GRID table and the *.dbf file. This tool is useful when ArcGrid datasets are created from the LCP to ArcGrids utility.

Important Notes:

- The Smart Assembler generates *.dbf files in the output directory by default in its automated data processing routine.
- Ensure the output raster is not in the ArcMap session to avoid program instability and crashes.

ArcGIS Project Raster

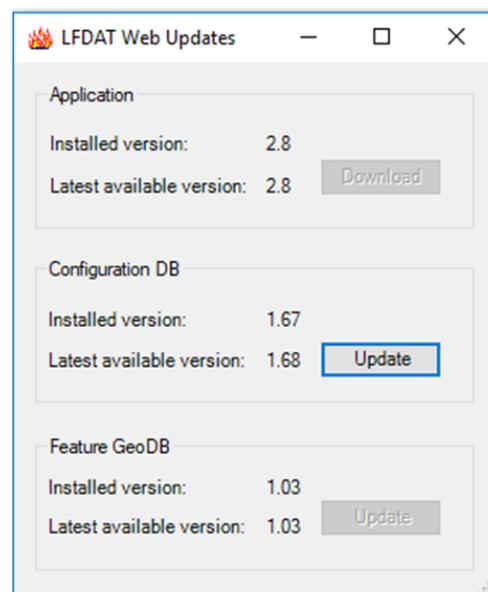
The LFDAT project raster utility was replaced with the ArcGIS project raster to provide better performance when re-projecting an LF raster in ArcMap.

Product Updates

A product update feature is available from the *About* tool, accessed from button **8**  on the toolbar.

Important Note:

- Users are encouraged to check for updates regularly to ensure they are accessing the latest products.



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Known Issues

1. Installation issue

The specific requirements listed above under **System prerequisites** need to be met for LFDAT to install and run correctly. A key requirement is that the appropriate Microsoft .NET Framework and ESRI .NET libraries must be installed on the system. If the .NET Framework was not on the system at the time ArcGIS was installed, then access to the ArcGIS installation media will be required to add the ESRI .NET libraries. Contact your system administrator if you experience problems with the installation.

2. Download and connection issues with DDS

LFDAT can encounter issues when downloading from the DDS. This can lead to zip files that are “invalid”. This can impact the Smart Assemble feature. Always check zip files and download again if necessary.

3. Attribute tables for Imagine (.img) and GeoTIFF (.tif) formats

LFDAT does not attach attributes when converting a LCP file to ArcGrids. A *.dbf file containing the raster attribute table is written for each image. After LCP to ArcGrids outputs are completed, use the “Attach DBF to ArcGrid VAT” tool.

4. Extent rectangle request issue

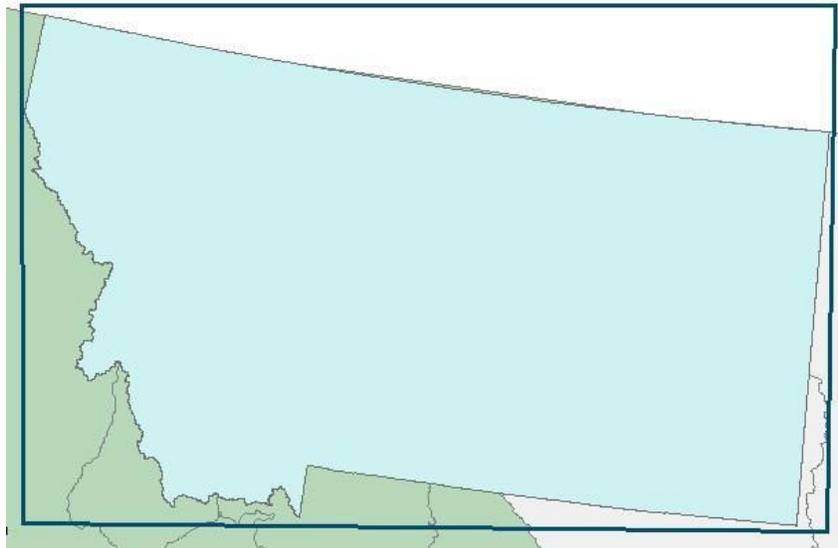
LFDAT mimics the functionality of the LF DDS system (<https://www.landfire.gov/viewer/>) by allowing a user to click and drag a box to define a download area. The LF DDS interface displays data in a geographic map projection. When a user drags a box in the web interface the latitude and longitude of the upper left and lower right corners of the requested rectangle are captured and passed along to the seamless data extraction server.

LFDAT behaves in a similar manner. However, the view frame in an ArcMap session is determined by the user. If the view frame is in a projected coordinate system, then the rectangle bounding coordinates are reprojected to latitude and longitude and passed along to the data extraction server. This procedure introduces a subtle problem because the user-drawn rectangle becomes warped.

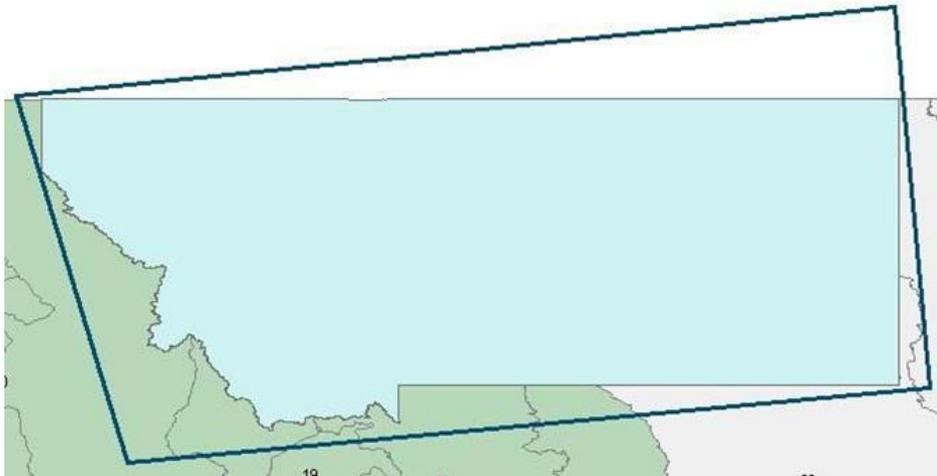
Consider the following example: a user opens a new session of ArcMap, checks the data availability from the “LANDFIRE Data Status” in the form tool, and add the LF Map Zones to the session. The last steps load a feature class of the LF map zones that are projected in the LF Albers projection. The user drags the blue box below around an area of interest, as shown in the example below.

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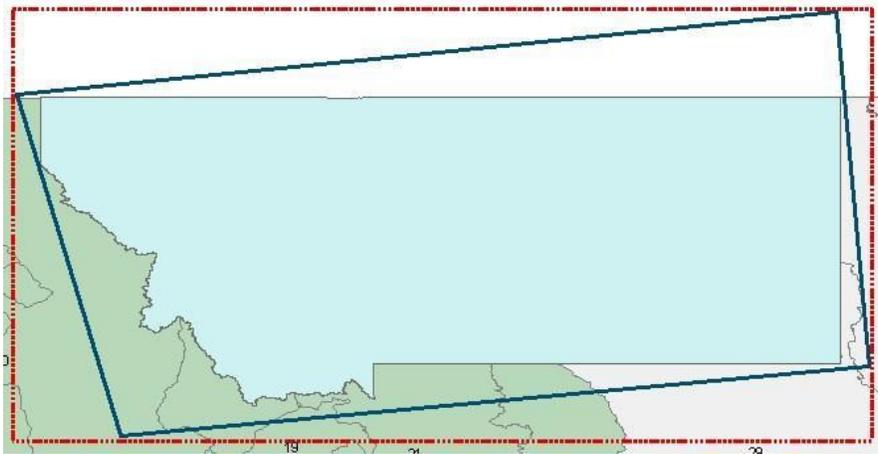
LFDAT captures the coordinates from the corners of the rectangle and reprojects them from Albers to geographic coordinates. The warped rectangle and the corresponding request on the LF DDS website would look something like the example below. Please note that if the upper left and lower right coordinates of the warped rectangle are passed along to the server, then part of the data request would be truncated.



To avoid this issue LFDAT makes a request to the extraction server that encompasses the entire requested area. That request would correspond to the dashed red line in the example below. For large areas like the state of Montana, this process results in a much larger extent request and download. For smaller extents the effect will be less noticeable.

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To avoid this issue, users can reproject the ArcMap data frame to the WGS84 Geographic projection prior creating a request to the LF DDS.LFDAT

Tutorial

A tutorial can be downloaded and installed from https://www.landfire.gov/download_lfdats.php to better understand LFDAT options and tools.

FAQs

Additional known issues with solutions can be found on the LF FAQ web page <https://www.landfire.gov/faq.php#lfdats>.

Acknowledgements

Development of LFDAT utilizes open source software:

Certain raster processing is done with the Geospatial Data Abstraction Library (GDAL). (<https://www.gdal.org>).

Zip file extraction is done with SharpZipLib: <https://github.com/icsharpcode/SharpZipLib>.

Support/Questions/Comments/Bug Reports

For support and general questions, please contact the LF [Helpdesk](#).

For more information regarding the LANDFIRE Program, <https://www.landfire.gov>.