Getting Started with the LCMAP WMS in ArcMap Quick Guide

The Land Change Monitoring, Assessment, and Projection (LCMAP) initiative released an Open Geospatial Consortium (OGC) compliant (Version 1.3) Web Map Service (WMS) endpoint for all ten LCMAP science products. The WMS layers are enabled with a Time dimension, meaning that users can access the entire 35+ year archive of LCMAP data. The available timesteps can be found in the Time Dimension tag in the WMS GetCapabilities link for the endpoint. The WMS consists of a single endpoint that contains links to access all ten LCMAP layers. The LCMAP WMS can be consumed using software such as QGIS, ESRI's ArcMap, or directly using programming languages such as Python. Users can also view the LCMAP WMS directly in a web browser using the LCMAP Web Viewer.

This Quick Guide provides step-by-step instructions for interacting with the LCMAP WMS endpoint in ArcMap. Be sure to check out the LCMAP WMS page on the LCMAP Website for instructions on working with the LCMAP WMS using other software.

LCMAP WMS Endpoint

Table 1. List of LCMAP Products and corresponding LCMAP WMS layers.

LCMAP Product	WMS Layer Title
Primary Land Cover (LCPRI)	primary-landcover_conus_year_data
Secondary Land Cover (LCSEC)	secondary-landcover_conus_year_data
Primary Land Cover Confidence (LCPCONF)	primary-confidence_conus_year_data
Secondary Land Cover Confidence (LCSCONF)	secondary-confidence_conus_year_data
Annual Land Cover Change (LCACHG)	cover-change_conus_year_data
Time of Spectral Change (SCTIME)	change-day_conus_year_data
Change Magnitude (SCMAG)	change-magnitude_conus_year_data
Time Since Last Change (SCLAST)	spectral-lastchange_conus_year_data
Spectral Stability Period (SCSTAB)	spectral-stability_conus_year_data
Spectral Model Quality (SCMQA)	model-quality_conus_year_data

Required Software: These instructions were produced using ArcMap version 10.6.1. It is recommended that users install the most recent version of ArcMap for their operating system.

Instructions:

1. Open **ArcMap** and start a new blank map by selecting: Getting Started > New Maps > My Templates > Blank Map
2. Using the **Menu Toolbar,** select Windows > Catalog

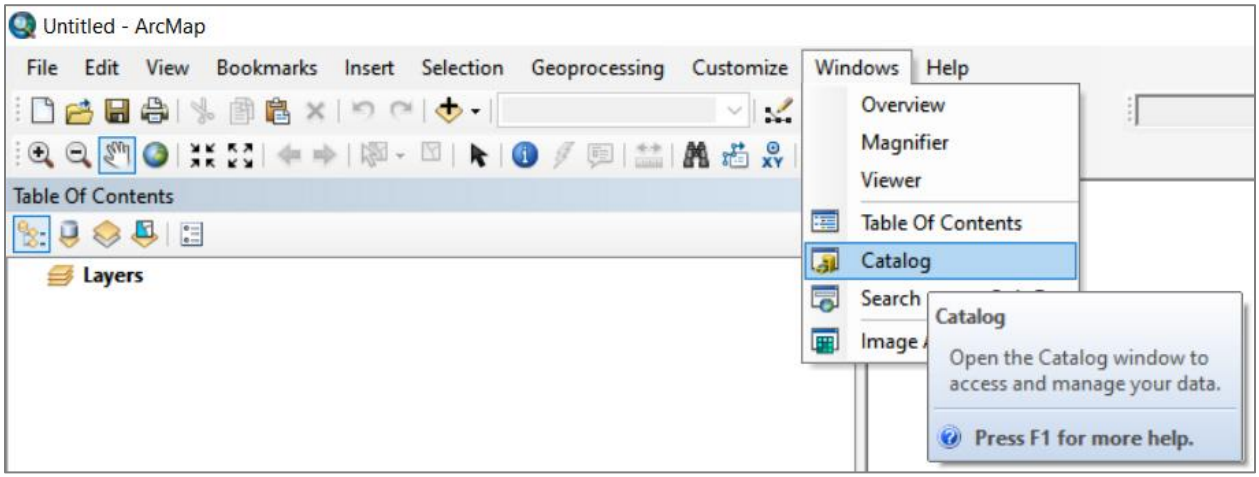

Figure 1. Opening the ArcMap Catalog.

3. In the **Catalog**, hit the expand (+) symbol on **GIS Servers**. Under the **GIS Servers** dropdown**,** double click **Add WMS Server**

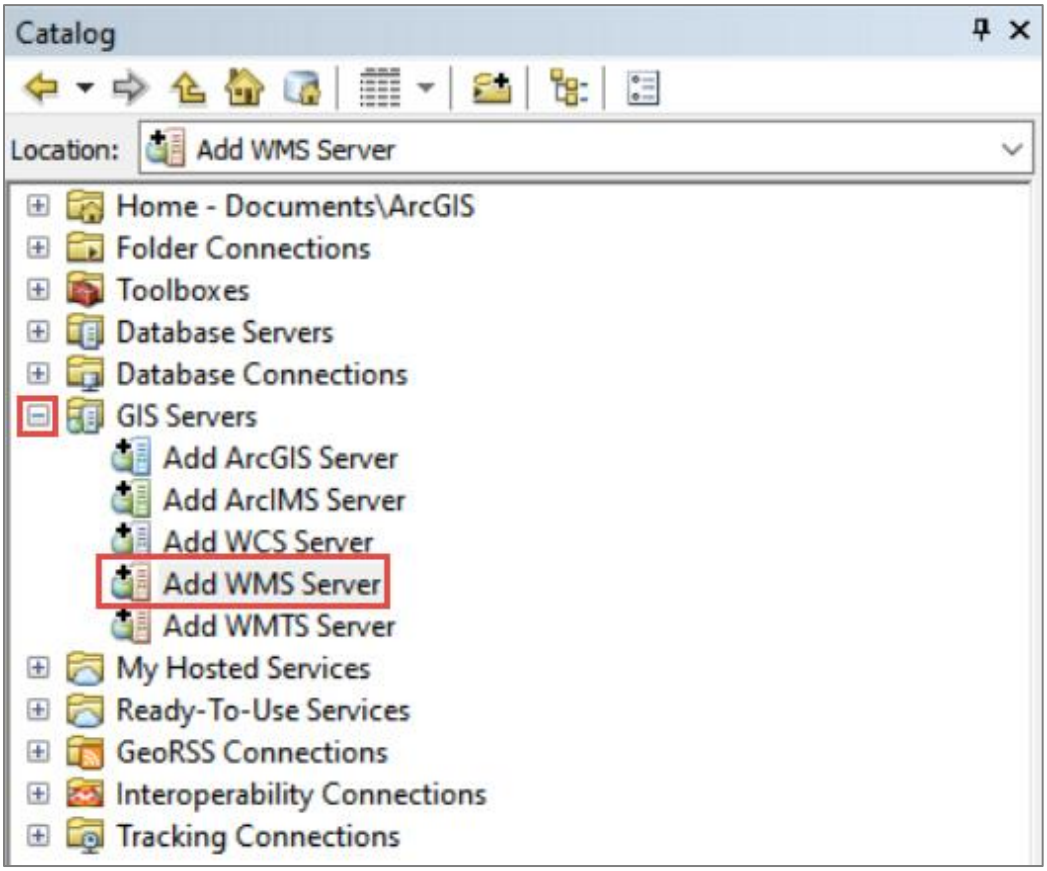

Figure 2. Adding a WMS Server connection in ArcMap.

4. In the **Add WMS Server Window**, add the LCMAP WMS **URL**:

   https://dmsdata.cr.usgs.gov/geoserver/lcmap/wms?service=WMS&request=GetCapabilities

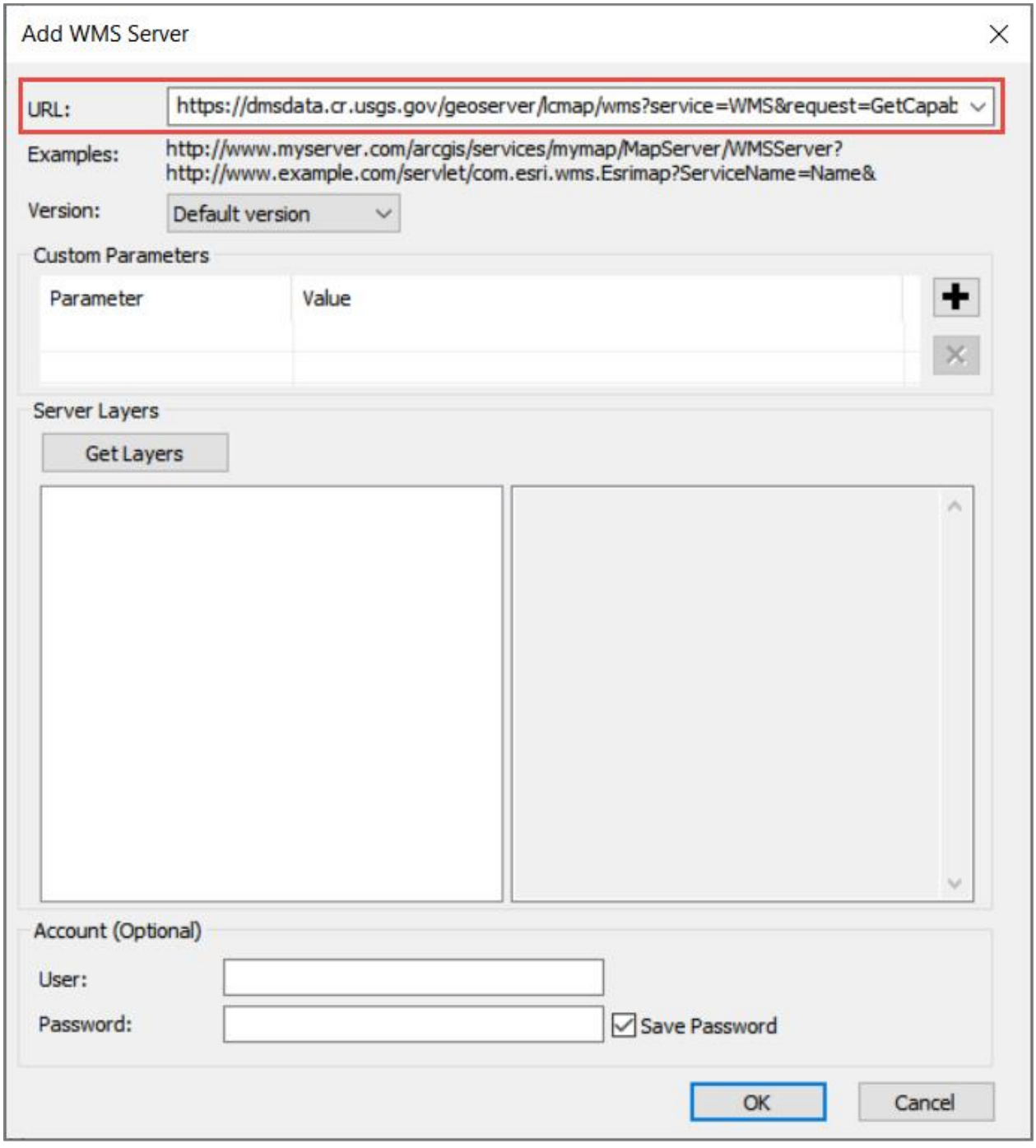

*Figure 3. Adding the LCMAP WMS URL to the **Add WMS Server Window** in ArcMap.*

5. Select the Get Layers button to see what LCMAP data layers are available. See Table 1 above to match each layer to the LCMAP product it represents.

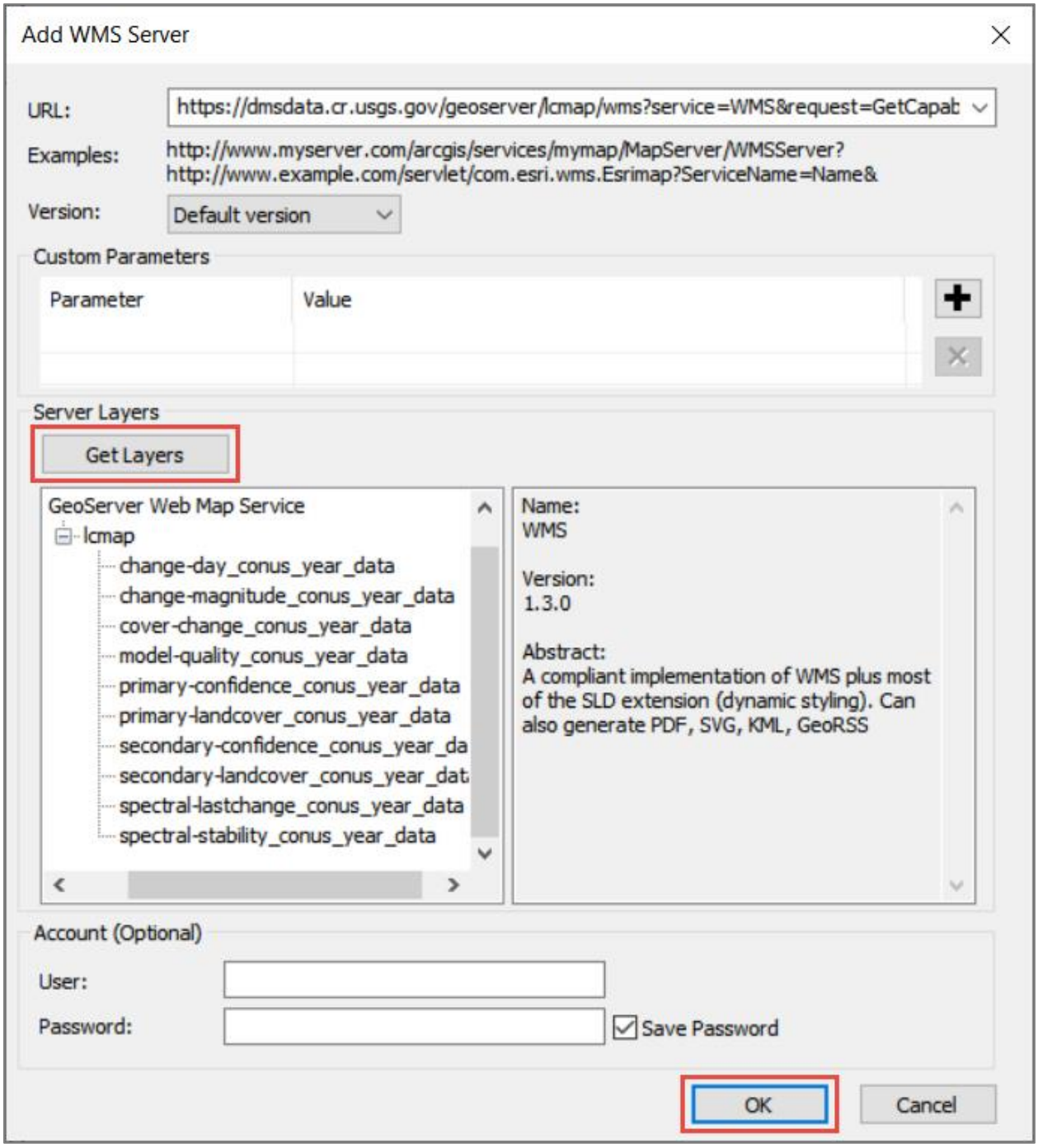

*Figure 4. Adding the LCMAP WMS layers to the **Add WMS Server** window in ArcMap.*

6. Select OK to add the endpoint.

7. In the **ArcCatalog Window**, click the GIS Servers dropdown. You should now see a link labelled "Geoserver Web Map Service on dmsdata.cr.usgs.gov".
    a. Tip: You can rename this anything you want by right-clicking the GIS Server layer and clicking rename
    b. Tip: If you have previously connected to a GIS Server, double click to reconnect to the service. If you are unsure if you are connected or not, there should be a dropdown (+) symbol next to the connection.

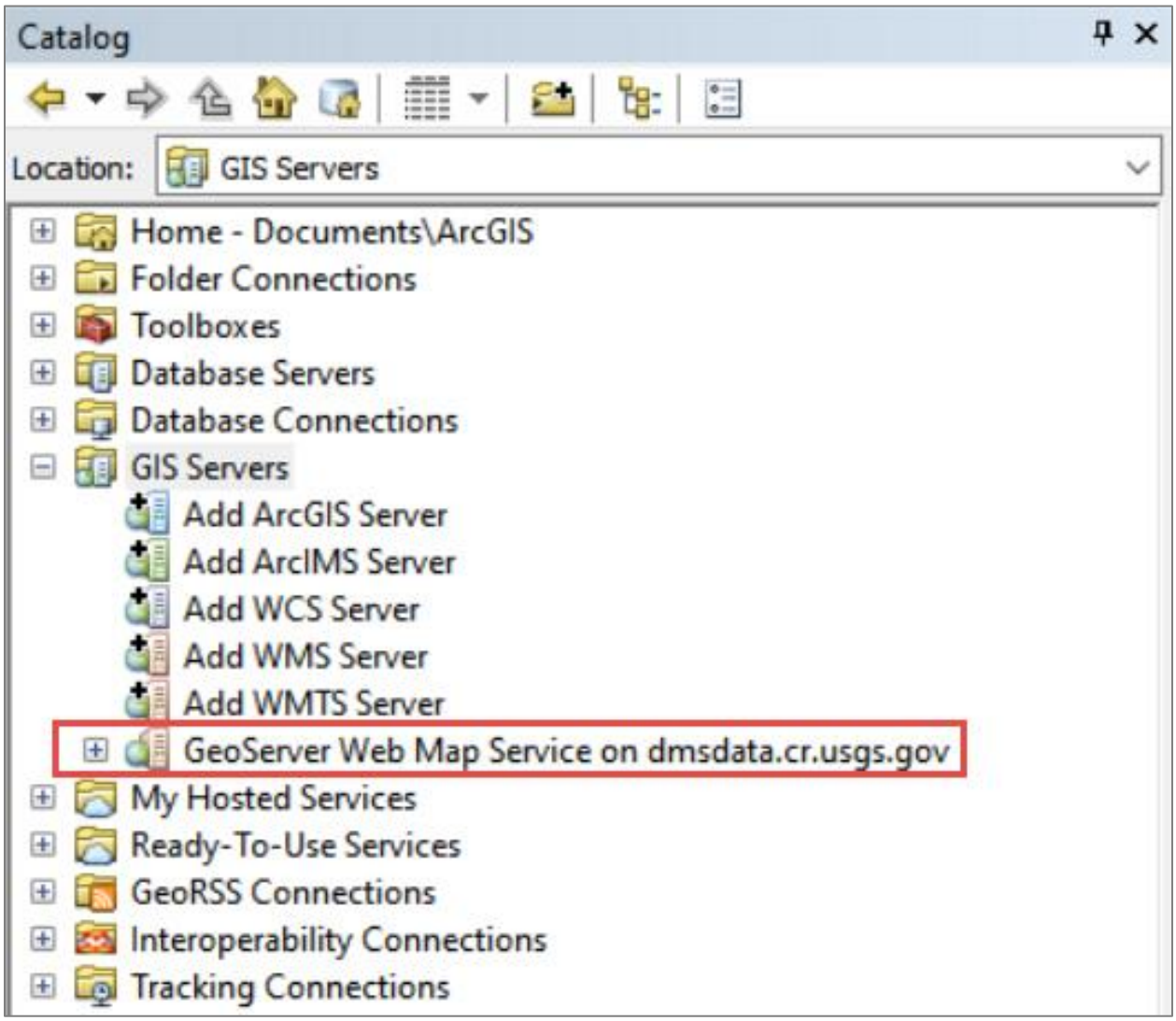

Figure 5. Showing the LCMAP WMS Server Connection in ArcCatalog.

8. Click the dropdown icons (+) until you reach lcmap.

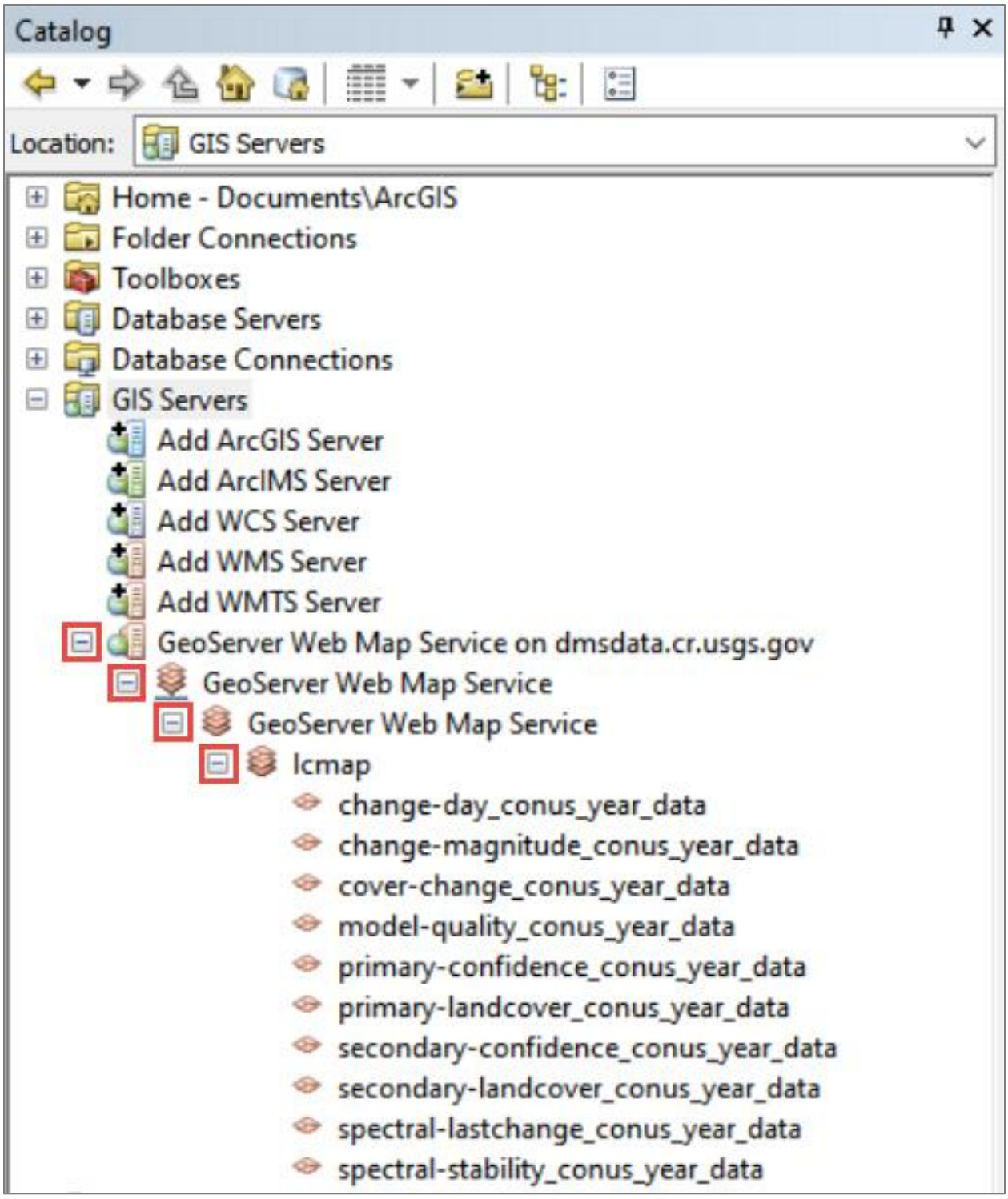

Figure 6. Showing the LCMAP WMS Server Connection dropdown navigation in ArcCatalog.

9. Drag the LCMAP product layer you want to use to the **Table of Contents.**
10. The map should now be available in the **Data Frame**.

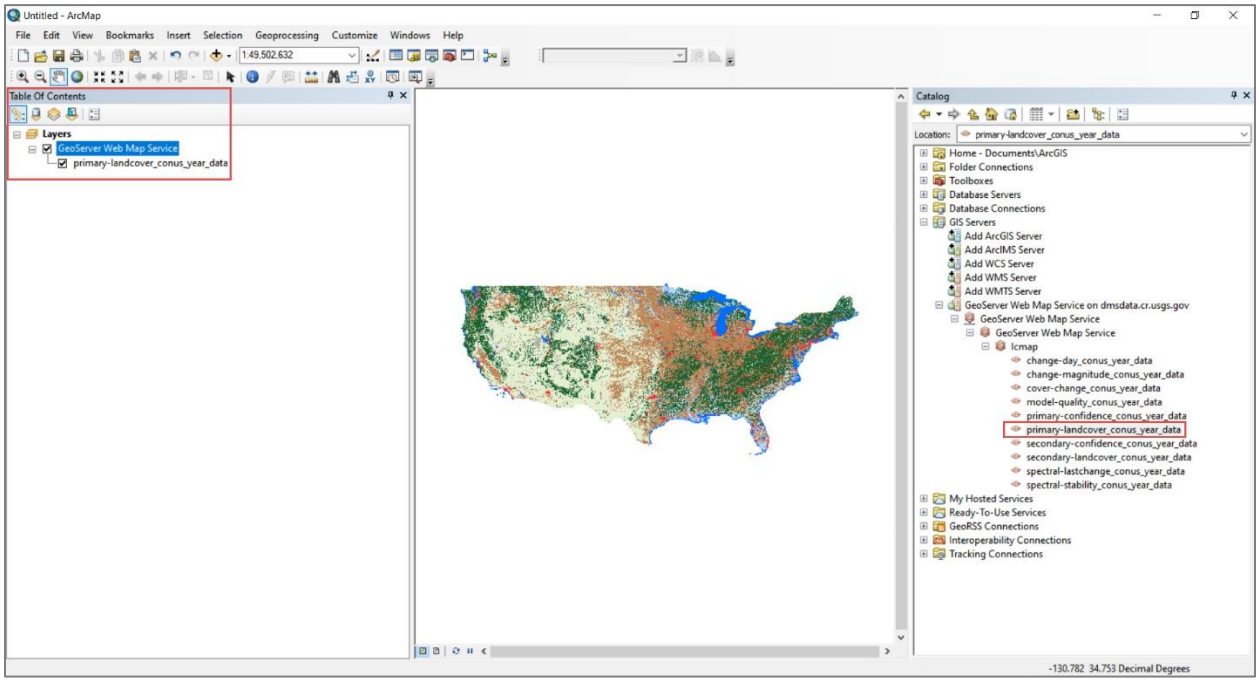

Figure 7. Example of LCMAP Primary Land Cover (LCPRI) layer added to the Table of Contents.

11. In the **Tools Toolbar**, select the clock symbol ( ) called the **Time Slider**.

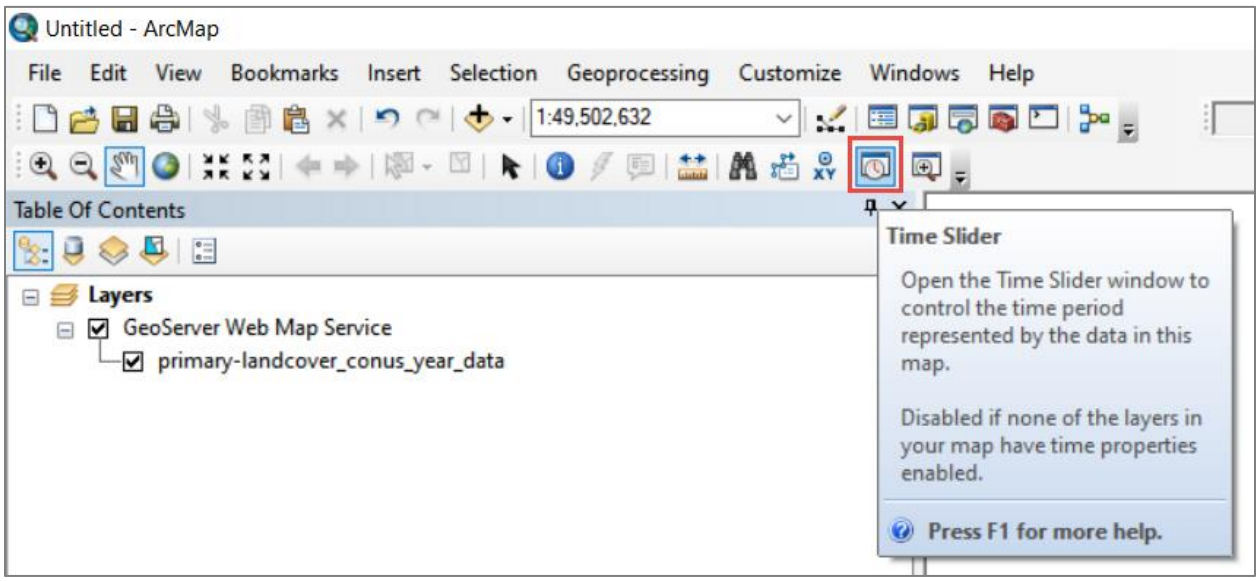

Figure 8. Location of the Time Slider tool in ArcMap.

12. The **Time Slider Window** will open. By default, the disable/enable time on map tool is set to enabled. Click on the **disable/enable time on map** button to disable the Time Slider.

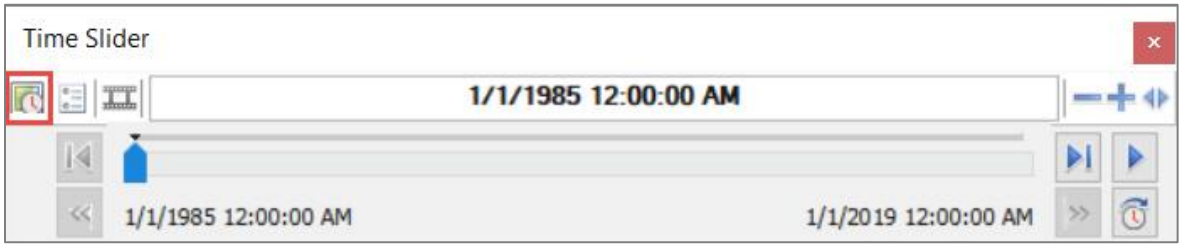

*Figure 9. Location of disable/enable time on map button in **Time Slider Window**.*

13. While enabled, the range should automatically default to 1985 (the first timestep available) and the map should now be showing LCMAP data from 1985.

14. By default, the time step interval will be set in hours. Click on the **Options** button ( ) in the **Time Slider Window** to open the **Time Slider Options Window**. In the **Time Display** tab, update the Time step interval from 1.0 *Hours* to 1.0 *Years*. Click OK to apply the changes.

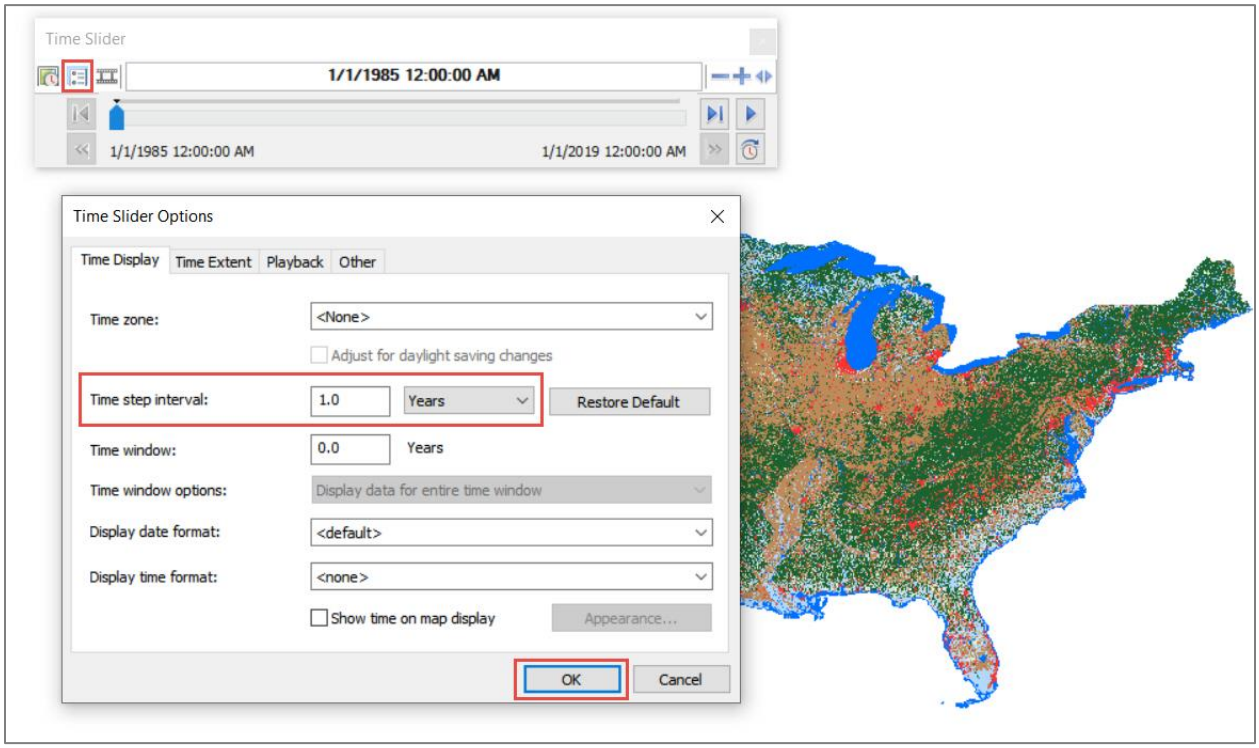

*Figure 10. Setting the Time step interval in the **Time Slider Options Window**.*

15. You can now use the forward/backward buttons to advance to either the next or previous time (year) interval.

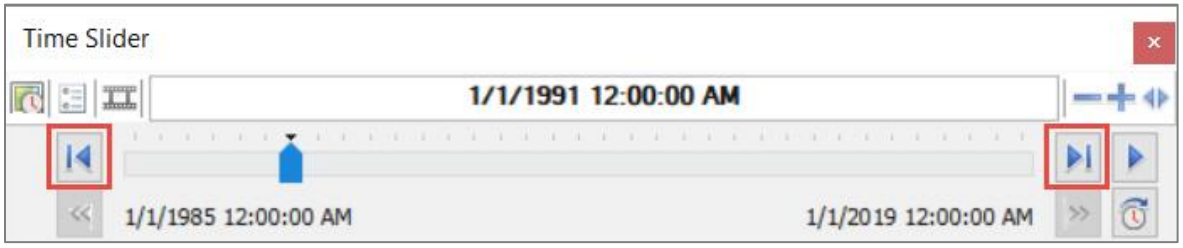

*Figure 11. Changing the year displayed in the **Time Slider Window**.*

16. Zoom in to your region of interest, and begin exploring the LCMAP time series. Here we have zoomed in to Boise, ID to look at urban expansion from 1985 to 2019.

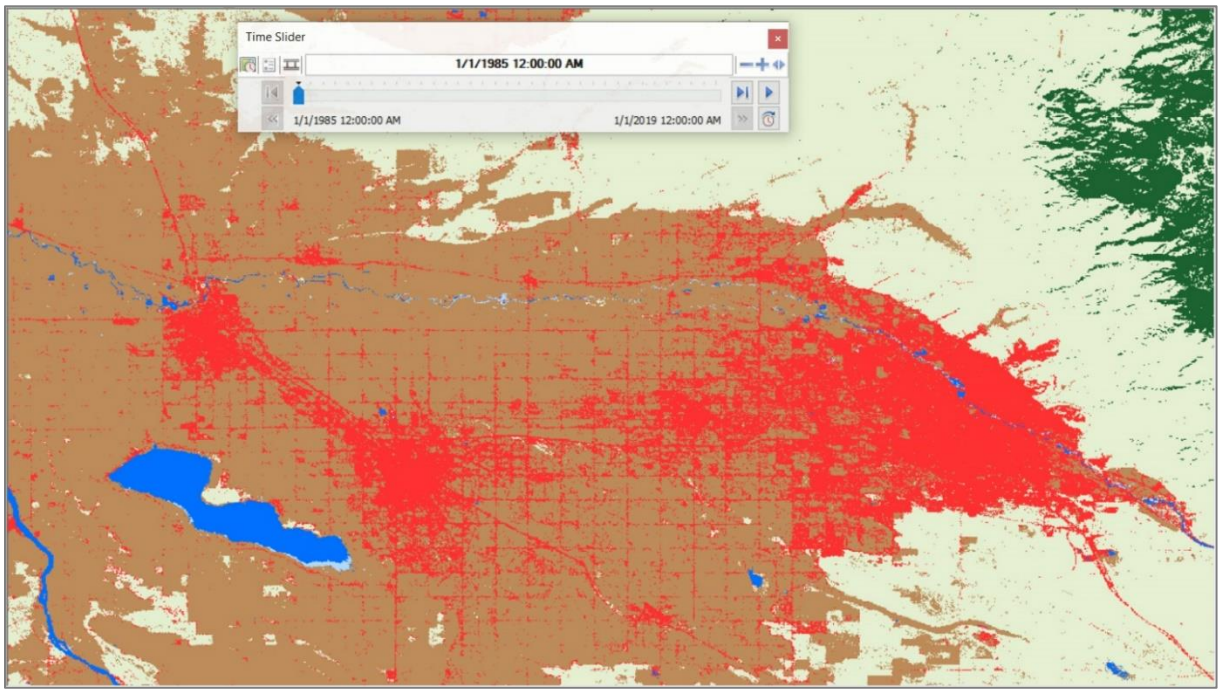

Figure 12. Primary Land Cover over Boise, ID from 1985.

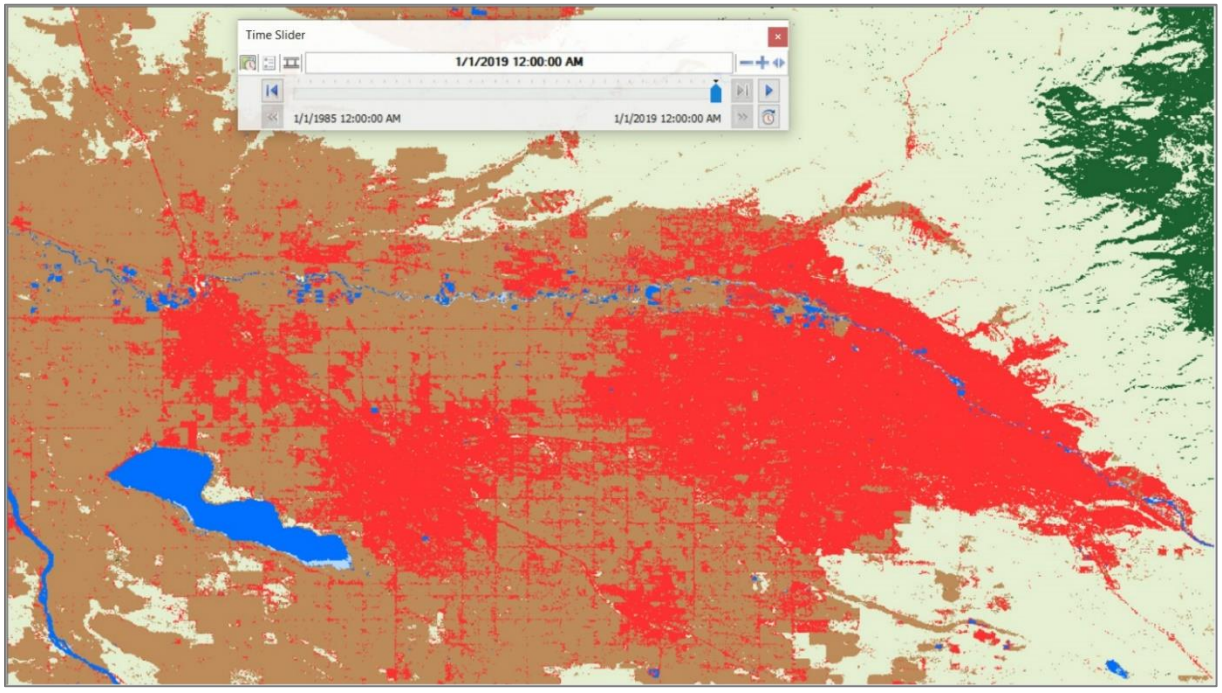

Figure 13. Primary Land Cover over Boise, ID from 2019.

Having Issues?

- Web Map Services stream information over the internet. Verify that you have an internet connection.
- Check your version of ArcMap, it is recommended to be using ArcMap version 10.6.1 or higher.
- Contact USGS EROS Customer Services