



ArcGIS OGC Interoperability Add-on User Guide

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Functional overview

The ArcGIS OGC Interoperability Add-on is part of the Web Services Interoperability Extension/Toolkit. The Interoperability Add-on tool enables you to add image services from OGC (OpenGIS Consortium)-compliant Web Map Servers (WMS), as well as feature services from ESRI Web Feature Servers (WFS). Feature service layers are imported into ArcMap as standard ArcMap feature layers and image service layers are loaded as raster layers. The Interoperability Add-on tool also provides the ability to add Geography Markup Language (GML) files to your map, as well as the ability to export any feature layer to GML format.

The Interoperability Add-on tool includes support for:

- WMS 1.0.0, 1.1.0, and 1.1.1.
- WFS 1.0.0.
- Creation of GML files that conform to the rules defined in the GML 2.1.2 specification.
- Reading of GML files that are compliant with a specific format of GML 2.1.2.

The feature layer functionality in ArcMap can be applied to WFS and GML layers, and the raster layer functionality can be applied to WMS layers added using the Interoperability Add-on tool. The Interoperability Add-on tool will be updated as additional OGC specifications are implemented. See <http://www.opengis.org> for information on the OGC specifications.

Installation and setup

Installation

To install the Interoperability Add-on tool, [download the Interoperability Add-on toolbar zip file](#) to any directory on your machine's hard drive. Unzip the contents of this file to any directory on your machine, and run Setup.exe. Follow the directions in the installation dialogs. See Setup.htm included in the zip file for system requirements and installation instructions.

Adding the toolbar to ArcMap

After installing the Interoperability Add-on tool, you may need to add the Interoperability Add-on toolbar to ArcMap. This toolbar includes buttons that enable access to the Interoperability Add-on's functionality.

There are two ways to add the toolbar to ArcMap if it is not automatically displayed:

- Option 1:** Go to the Tools menu and select Customize. Choose the Toolbars tab and check the Interoperability Tools checkbox. Click Close. See Figure 1. The toolbar displays.

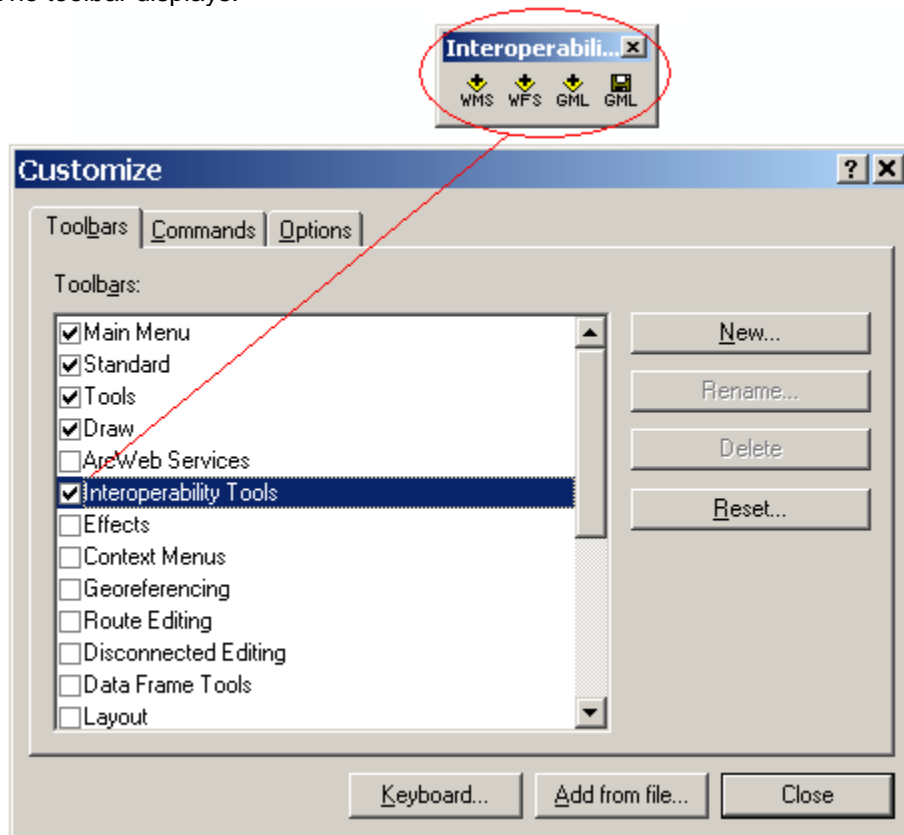


Figure 1: Adding the Interoperability Add-on toolbar to ArcMap

- Option 2:** Click the View menu, choose Toolbars, and check Interoperability Tools.

Adding WMS data



The Add WMS Data button opens a dialog box (see Figure 2) that allows you to add WMS image services to your map. You may type or select the URL address of a server that hosts WMS image services, get a list of layers available in a service, and select layers to add to your map.

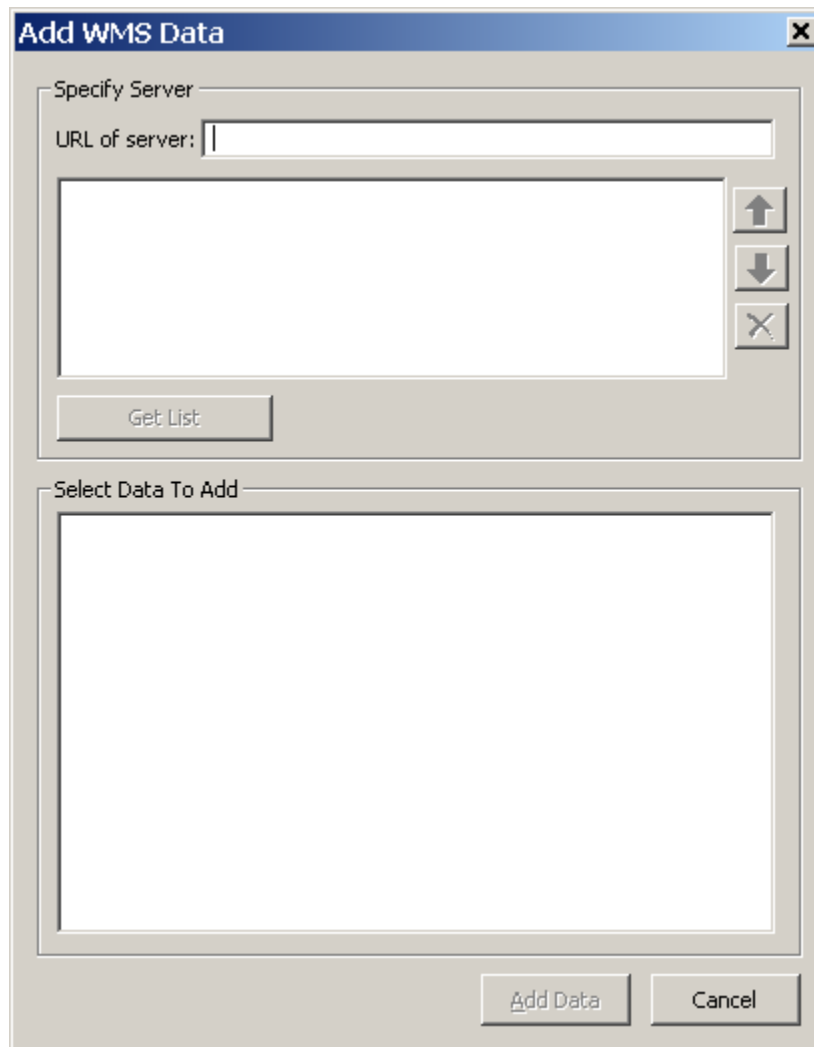


Figure 2: The Add WMS Data dialog

Listing WMS data layers

To display a list of image service layers hosted on a WMS:

1. Enter the URL of a server that hosts WMS image services in the URL of Server textbox. For example:

<http://www.geographynetwork.com/servlet/com.esri.wms.Esrimap?> – Hosted by ESRI

<http://viz.globe.gov/viz-bin/wmt.cgi> – Hosted by NASA

Note: See Appendix A for a list of WMS services successfully tested at release time.

2. Click Get List for a list of image service layers hosted on the server.
3. A list of image service layers available on that server displays under Select Data to Add. See Figure 3.

Note: Get List sends a request over the Internet. If it takes too long for the list to display, click Cancel on the Add WMS Data dialog box to cancel the request.

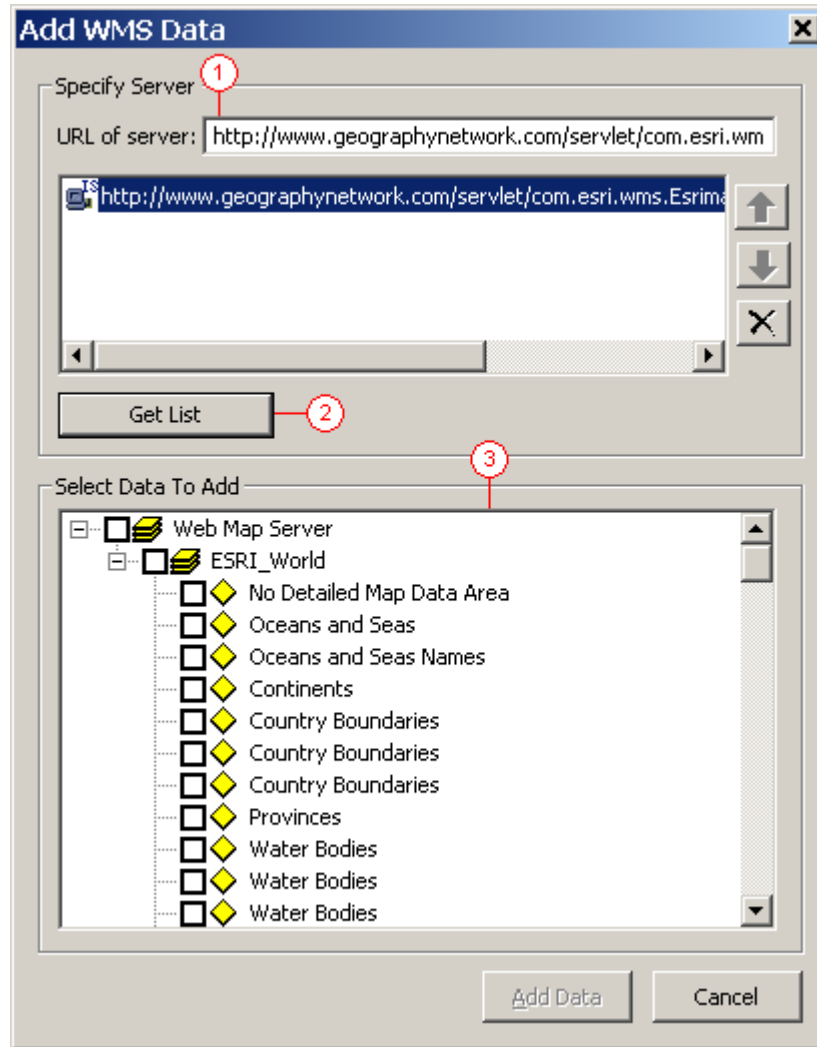


Figure 3: Displaying a list of image service layers hosted on a WMS

Adding WMS data to your map

Once services and layers are listed under Select Data to Add:

1. Check the ones you want to add to your map.
2. Click Add Data. See Figure 4.

Check the service name to automatically check all that service's layers, or check individual layers to add them to your map.

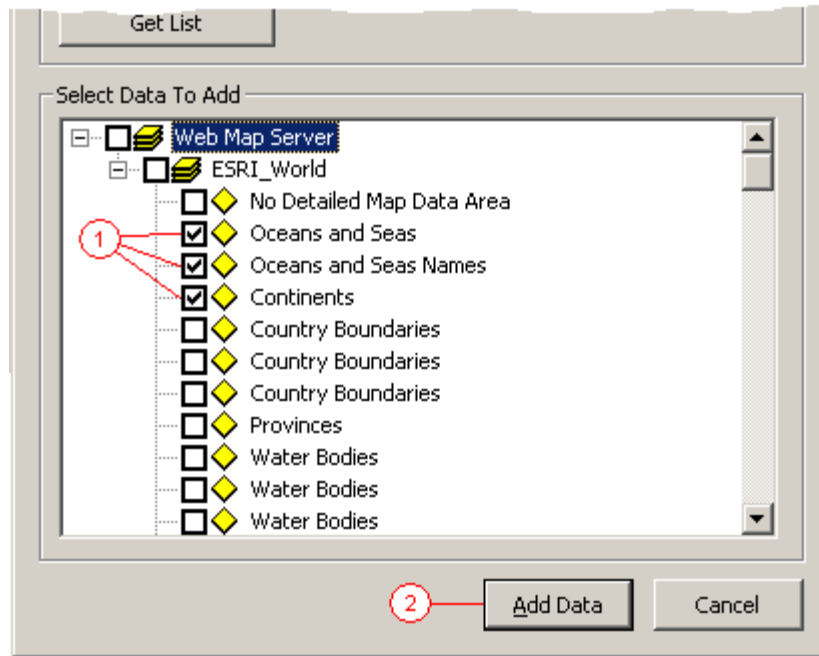


Figure 4: Adding WMS Data to your map

Note: Since the data is added from over the Internet, many factors, such as network performance, number of layers, and server performance, contribute to how quickly the data loads and displays in ArcMap. To cancel an operation that is taking too long to display, click Cancel on the Add WMS Data dialog box to cancel the map display. If the Add WMS Data dialog is closed, press the Esc key to stop ArcMap from trying to draw the map.

When displaying WMS layers, image files are generated and stored in your user TMP directory. If this is not found, then the image files are written to your system TMP directory. See the Layer Properties of the WMS service layer to find out exactly what directory these images are written to. Select the Source tab to see where the source images are located. ESRI recommends that you periodically delete the files in this directory to prevent your system from running out of disk space.

Identifying features from a WMS layer

You can use the ArcMap Identify tool to identify features from WMS layers. To do this:

1. Click the Identify tool and click on the map to open the Identify Results dialog box.
2. Select from the list of layers and click on the map to identify features. The attributes for all features in the service that intersect the identify point display in the Identify Results dialog box in XML format.

Note: Not all WMS layers support the Identify function. Attributes can only be returned for layers listed in the Identify dialog's Layers dropdown list.

Note: When identifying features in WMS point or line layers, it is best to zoom into a large scale before using the Identify tool. This process sends the x,y location of the Identify click to the WMS service to find the features that intersect the location. The closer you are zoomed in, the more likely accurate attribute information will be returned from the service.

Managing the servers in your server list

After a list of layers provided by a specified server displays, that server's URL is added to the server list in the Specify Server control group. See Figure 5.

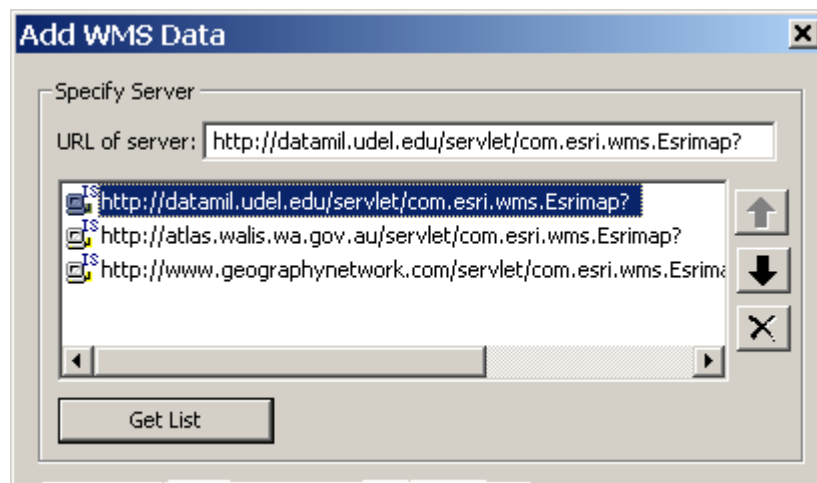


Figure 5: The Add WMS Data server list

This list is saved and is available to you in future ArcMap sessions. Since there is no limit to the number of servers you can save in this list, buttons are included to reorder and remove the servers and help you organize the list. You can also right-click a server to rename it. This doesn't change the server's URL; it allows you to assign it an alias so you can easily identify the server the URL represents.

Adding WFS data



The Add WFS Data button opens a dialog box (see Figure 6) that allows you to add WFS feature services to your map. You may type or select the URL address of a server that hosts WFS feature services, get a list of layers available in a service, and select layers to add to your map. The Add WFS Data dialog box is similar to the Add WMS Data dialog box, but requires the URL to reference a valid WFS server.

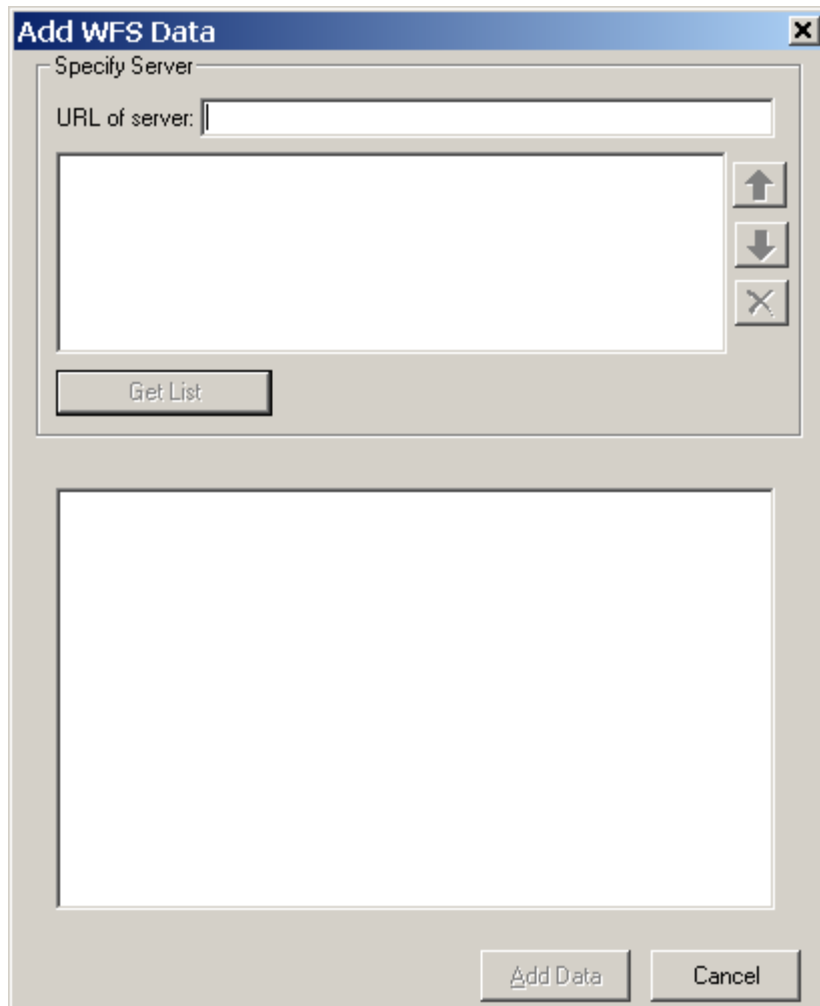


Figure 6: The Add WFS Data dialog

Listing WFS data layers

To display a list of image service layers hosted on a WFS:

1. Enter the URL of a server that hosts WFS feature services in the URL of Server textbox.
2. Click Get List for a list of feature service layers hosted on the server.
3. The list of feature service layers available on that server displays under Select Data to Add.

Adding WFS data to your map

Once services and layers are listed under Select Data to Add:

1. Check the layers you would like to add to your map.
2. Click Add Data.

Check the service name to automatically check all that service's layers, or check individual layers to add them to your map.

Using WFS layers

The Interoperability Add-on converts WFS layers to standard ArcMap feature layers, so operations that can be performed on standard feature layers also can be done on WFS layers.

Managing the servers in your server list

After a list of layers provided by a specified server displays, that server's URL is added to a server list in the Specify Server control group. This list is saved and is available to you in future ArcMap sessions.

Since there is no limit to the number of servers you can save in this list, buttons are included to reorder and remove the servers and help you organize the list. You can also right-click a server to rename it. This doesn't change the server's URL; it allows you to assign it an alias so you can easily identify the server the URL represents.

Adding GML data



Geography Markup Language (GML) files are XML-based files that represent simple geographic features (points, lines, and polygons) and their attributes. The GML file stores the feature and attribute data, and a corresponding schema file (.xsd) defines the data structure.

The Add GML Data button opens a dialog box that allows you to add GML data directly to your map. See Figure 7.

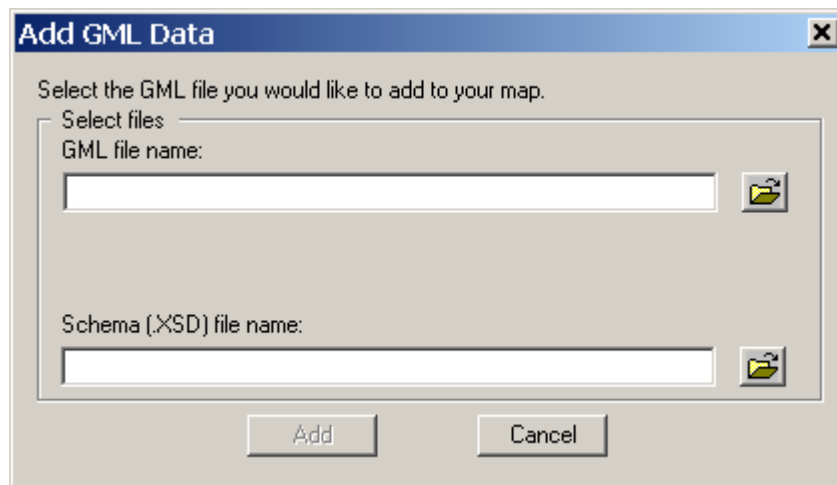


Figure 7: The Add GML Data dialog

To add a GML file to your map:

1. Enter the full path and filename of the GML file you want to add in the GML Filename textbox. For example, D:\GMLData\USA\States.gml. You can browse to a GML file using the browse button.
2. When adding a GML file, you need to specify a corresponding XSD file. If an XSD file with the same filename as the GML file specified in step 1 exists in the same directory as the GML file, then the Schema (.xsd) Filename textbox automatically is populated with this file. Click Add to add the GML file to your map.

If an XSD with the same filename as the GML file specified does not exist in the same directory as the GML file, then you are asked to select an XSD file. You may enter the full path and filename of the XSD, or browse to the XSD file using the browse button. Click Add to add the GML file to your map.

The Interoperability Add-on converts GML layers to standard ArcMap feature layers, so operations that can be performed on standard feature layers can also be done on these GML layers.

Exporting feature layers to GML format



The Export Feature Layer to GML dialog box opens when you click the Export to GML button. This dialog allows you to export any feature layer in your map to GML format. See Figure 8.

Note: The Export to GML button is unavailable if no feature layers are in the Data Frame. This includes WFS layers, shapefile layers, geodatabase layers, and personal geodatabase layers.

To export a feature layer to GML format:

1. Select the feature layer you want to export under Select layer to export. Only one layer can be selected at a time.
2. In the Export dropdown list, choose whether you want to export all features, only the selected features (if features are selected), or only the features visible in the View's current extent.
3. Specify an output GML filename in the GML file name textbox. You can type the full path and filename or browse to the file using the browse button.
4. When you specify your output GML file, the Schema (.XSD) file name textbox is automatically populated with an XSD file name. You can change this output XSD file name and location by typing in a new filename or by browsing to a file using the browse button.

5. Click OK.

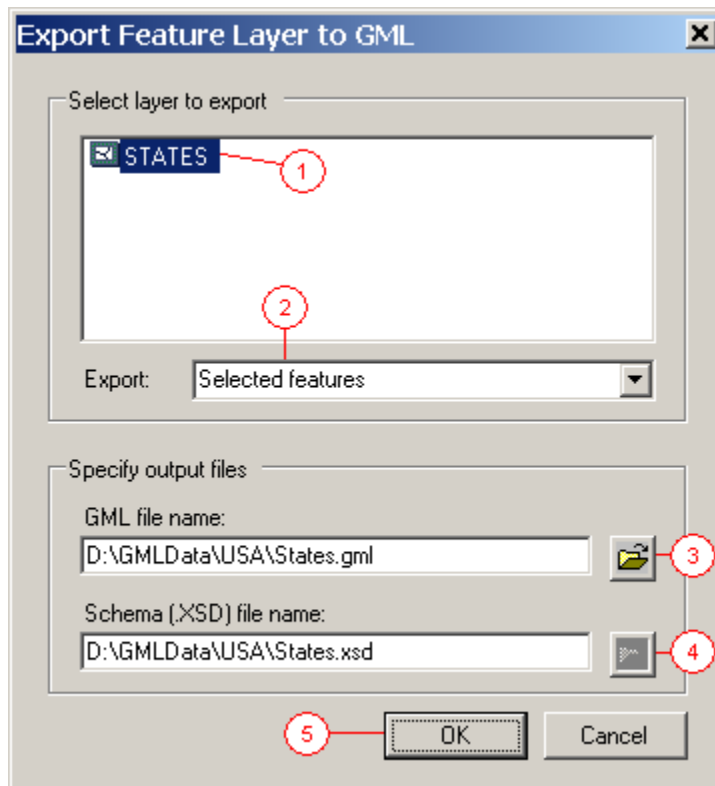


Figure 8: Exporting a feature layer to GML format

Rendering the data

After the data is imported into ArcMap, feature layers from a WFS or a GML file are stored as feature layers. The layer's data type correlates with the feature type created. Four types of feature layers are recognized: point, polyline, simple polygon, and complex polygon (a polygon with holes). Since ArcMap recognizes the imported features as feature layer data, all rendering tools ArcMap offers for these types of layers are available for the newly imported data. You may also export or save the data.

In a similar fashion, raster type layers provided from a WMS are stored as raster layers. Any tools and styling available for raster data in ArcMap are available for use with the WMS data.

ESRI Technical Support

If you need assistance using the ArcGIS OGC Interoperability Add-on, visit the [Discussion Forum](#).

Technical assistance is provided through ESRI's Technical Support Center. Contact ESRI's Technical Support Center by telephone (909-793-3774), fax (909-792-0960) or [e-mail](mailto:support@esri.com) (support@esri.com). The Technical Support Center is available to answer your questions from 6:00 a.m. to 5:00 p.m. Pacific time, Monday through Friday, except ESRI holidays.

Before you call Technical Support

Before you call ESRI for technical support, you should be at your computer running ArcMap and the Add-on. Be prepared to give the following information:

- Your ESRI customer number.
- The software application and version that you are using.

-
- The type of hardware you are using including network hardware.
 - The operating system you are using.
 - The exact wording of any messages that appeared on your screen.
 - What happened and what you were doing when the problem occurred.
 - How you tried to solve the problem.

Appendix A: WMS Servers Tested

ESRI successfully tested the following WMS servers with the Interoperability Add-on tool:

http://atlas.gc.ca/cgi-bin/atlaswms_en?

<http://atlas.walis.wa.gov.au/servlet/com.esri.wms.Esrimap?>

<http://cabi.graphdata.co.uk/webmapservice/planaccesswms.asp>

<http://clearinghouse1.fgdc.gov/scripts/ogc/ms.pl>

<http://datamil.udel.edu/servlet/com.esri.wms.Esrimap/census2k?>

<http://geo.compusult.net/scripts/mapman.dll?Name=weather>

<http://gbkn-bestel.geodan.nl/cgi-bin/webmapping/sclmapserver.exe>

<http://gisdata.usgs.net/servlet/com.esri.wms.Esrimap?>

<http://globe.digitalearth.gov/viz-bin/wmt.cgi>

<http://lioib.lio.mnr.gov.on.ca/lioogc/default.asp>

<http://loki.compusult.nf.ca/scripts/mapman.dll?Name=DAFIF>

<http://longview.ac3.com.au/servlet/com.esri.wms.Esrimap?>

<http://scomap.socialchange.net.au/cgi-bin/mapserv?map=mapfiles/geoscience10m.map>

http://srss-ms.dola.wa.gov.au/pilot_cadastre/cadastre.xml?

<http://teraserver.microsoft.com/ogccapabilities.ashx>

http://wms.globexplorer.com/gexservlets/wms?SERVICENAME=wms_world

<http://www.cubewerx.com/demo/cubeserv/cubeserv.cgi?>

<http://www.dottedeyes.com/wms/>

<http://www.geographynetwork.com/ogc/com.esri.ogc.wms.WMSServlet?>

<http://www.geographynetwork.com/servlet/com.esri.wms.Esrimap?>

<http://www.hazardmaps.gov/wmsRequest.php>

<http://www.mapinfo.com/miwwms>

<http://www2.demis.nl/mapserver/Request.asp?>

Appendix B: FAQ

Frequently Asked Questions (FAQ) address issues that commonly occur when using the Interoperability Add-On tool.

FAQs are organized into three categories:

[General](#)
[WMS](#)
[WFS and GML](#)

General

- [Can ArcGIS MXD files that contain references to WMS, WFS, or GML data be distributed to other ArcGIS users?](#)
- [Can ArcReader read PMF files that were created from an MXD file that contains references to WMS, WFS, or GML data?](#)
- [Can I use an MXD file that contains references to WMS, WFS, or GML data to publish an ArcMap Image Service?](#)
- [Can I edit WMS, WFS, or GML layers?](#)
- [How does the Interoperability Add-on tool handle projections \(i.e., SRS, or Spatial Reference Systems\)?](#)
- [What should I do when I see the following text in the ArcMap status bar 30 seconds after I click the Get List button in the Add WMS or Add WFS Data dialog? *"The server has not yet responded to your request... click Cancel to interrupt and try again"*](#)
- [Does the Interoperability Add-on tool work with ArcGIS 9.0 Prerelease?](#)

Can ArcGIS MXD files that contain references to WMS, WFS, or GML data be distributed to other ArcGIS users?

Yes. But the receiving party must have the Interoperability Add-on tool installed on their computer.

Can ArcReader read PMF files that were created from an MXD file that contains references to WMS, WFS, or GML data?

No. ArcReader does not support these types of layers.

Can I use an MXD file that contains references to WMS, WFS, or GML data to publish an ArcMap Image Service?

No. ArcMap Server does not support these types of layers.

Can I edit WMS, WFS, or GML layers?

No. However you can save WFS and GML layers to a shapefile or geodatabase and edit those.

How does the Interoperability Add-on tool handle projections (i.e., SRS, or Spatial Reference Systems)?

WMS or WFS layers are requested using the SRS code for the first ArcMap-supported coordinate system it finds in the GetCapabilities response. It uses this SRS code when requesting data. If the ArcMap data frame is in a different coordinate system than that of the requested data, ArcMap reprojects the data on the fly before it is displayed. When WMS data is reprojected, the reprojected image is likely to become more grainy and warped than it is when it is not reprojected. WMS and GML layers are vector based, so they display more accurately when reprojected by ArcMap.

What should I do when I see the following text in the ArcMap status bar 30 seconds after I click the Get List button in the Add WMS or Add WFS Data dialog?

“The server has not yet responded to your request... click Cancel to interrupt and try again”

This message displays after ArcMap has waited 30 seconds for a GetCapabilities response from a WMS or WFS server. If you don't click Cancel, ArcMap continues to wait for a response. If ArcMap never receives a response from a WMS or WFS server, the request may have been lost on the Internet. If the problem persists, it is possible that you are trying to connect to a server that performs a redirect. If you connect to the Internet using an authenticating proxy server, you may not be able to list layers from these servers. This is a proxy server limitation. Two WMS servers that do server-side redirects are:

- <http://www.cubewerx.com/demo/cubeserv/cubeserv.cgi?>
- <http://www.mapinfo.com/miwms?>

Does the Interoperability Add-on tool work with ArcGIS 9.0 Prerelease?

No.

WMS

- [What should I do when I see the following text in the ArcMap status bar 30 seconds after I click the Get List button in the Add WMS or Add WFS Data dialog? “The server has not yet responded to your request... click Cancel to interrupt and try again”](#)
- [Why am I unable to see features of WMS layers that are checked on in the table of contents?](#)
- [When trying to view the USGS Digital Ortho-Quadrangles layer from Microsoft's WMS server \(<http://terraserver.microsoft.com/ogccapabilities.ashx?>\), why do I get the following error message? “DOQ Target Resolution ‘0’ cannot be less than 1 meter per pixel”](#)
- [When trying to view the USGS Raster Graphics \(Topo Maps\) layer from Microsoft's WMS server \(<http://terraserver.microsoft.com/ogccapabilities.ashx?>\), why do I get the following error message? “DRG Target Resolution ‘0’ cannot be less than 2 meter per pixel”](#)
- [How can I enable logging?](#)
- [What does enabling logging allow me to do?](#)
- [Why can't I use the Select Features tool to select features from a WMS layer?](#)

What should I do when I see the following text in the ArcMap status bar 30 seconds after I click the Get List button in the Add WMS or Add WFS Data dialog?

“The server has not yet responded to your request... click Cancel to interrupt and try again”

This message displays after ArcMap has waited for 30 seconds for a GetCapabilities response from a WMS or WFS server. If you don't click Cancel, ArcMap will continue to wait for a response. If ArcMap never receives a response from WMS or WFS server, the request may have been lost in Internet space. If the problem persists, it is possible that you are trying to connect to a server that performs a redirect. If you connect to the Internet using an authenticating proxy server, you may not be able to list

layers from these servers. This is a proxy server limitation. Two WMS servers that do server-side redirects are:

- <http://www.cubewerx.com/demo/cubeserv/cubeserv.cgi?>
- <http://www.mapinfo.com/miwms?>

Why am I unable to see features of WMS layers that are checked on in the table of contents?

WMS servers often host data that is visible only at certain scales. There are times when ArcMap does not know a layer's visible scale range. When this is the case, the layer's visibility checkbox is checked and not grayed out in the table of contents, but the layer only displays on the map when the map is zoomed to a valid scale. You can zoom around the map until the layer in question displays, or contact the service provider to find out what the visible scale ranges are.

When trying to view the USGS Digital Ortho-Quadrangles layer from Microsoft's WMS server (<http://terraserver.microsoft.com/ogccapabilities.ashx?>), why do I get the following error message?

"DOQ Target Resolution '0' cannot be less than 1 meter per pixel"

This message means that you are zoomed out too far to view this layer. This error displays at the layer's extent. Make sure you're zoomed to at least 1:10,000,000 and completely within the bounds of the U.S. to avoid getting errors from this service.

When trying to view the USGS Raster Graphics (Topo Maps) layer from Microsoft's WMS server (<http://terraserver.microsoft.com/ogccapabilities.ashx?>), why do I get the following error message?

"DRG Target Resolution '0' cannot be less than 2 meter per pixel"

This message means that you are zoomed out too far to view this layer. This error displays at the layer's extent. Make sure you're zoomed to at least 1:10,000,000 and completely within the bounds of the U.S. to avoid getting errors from this service.

How can I enable logging?

Open the log_conf.xml file in a text editor. This file is located in the \arcgis\arcexe83\bin\InteroperabilityExtension\ directory. Change the log_mode value to on:

```
<Log_mode value="on" />
```

Log files are written by default to the \arcgis\arcexe83\bin\InteroperabilityExtension\ directory. You can change this by setting a value for the Logfile_directory path in the log_conf.xml file. After making changes to this file, restart ArcMap for the changes to register.

What does enabling logging allow me to do?

When logging is enabled, the requests that the Interoperability Add-on tool generates and sends to WMS servers get printed to the corresponding log file:

- When clicking Get List, a GetCapabilities request is sent to the server, so these requests are printed to the GetCapabilities.log file.
- When clicking Add Data, a GetMap request is sent to the server, so these requests are printed to the GetMap.log file. GetMap requests are also sent and logged every time you navigate a map that has a WMS layer in it.
- When identifying features from a WMS layer, a GetFeatureInfo request is sent to the server, so these requests are printed to the GetFeatureInfo.log file.

When having problems with a particular WMS server or layer, it is a helpful troubleshooting technique to copy and paste these requests into a Web browser. All requests to WMS servers return data in xml, html, or plain text format, so the response that is returned can be displayed directly in the Web browser. Each request is time stamped, and new requests are appended to the end of the log files.

Why can't I use the Select Features tool to select features from a WMS layer?

WMS layers are basically raster layers. ArcMap doesn't support selection sets on raster layers. In addition, the WMS specifications do not include selection requests.

WFS and GML

- [When trying to load a layer from an ArcIMS WFS service \(using the WFS Connector for ArcIMS\), why do I get the following error message? "Unable to read GML file"](#)
- [When trying to add a GML file to ArcMap, why do I get the following error message? "Unable to read GML file"](#)

**When trying to load a layer from an ArcIMS WFS service (using the WFS Connector for ArcIMS), why do I get the following error message?
"Unable to read GML file"**

The most likely cause of this error is that the layer id in the WFS service's AXL file is a numeric value (i.e., 0, 1, 2, and so on). If you change the layer id to a string, the layer should load in ArcMap.

**When trying to add a GML file to ArcMap, why do I get the following error message?
"Unable to read GML file"**

The Interoperability Add-on tool supports a subset of the GML 2.1.2 specification. It is likely that the file you're trying to load includes unsupported elements.