About OGC WMS support in ArcGIS Desktop 9.0
(Introduced in Service Pack 2)

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What is WMS support?

Open Geospatial Consortium, Inc (OGC) Web Mapping Service (WMS) is an OpenGIS® standard specification for interactive mapping based on requesting map images from a server over the Internet. OGC WMS client support in ArcGIS® Desktop allows you to access these services over the Internet and add them to your maps as layers.

In ArcGIS Desktop 8.3, OGC WMS client support was provided by the OGC Interoperability Add-On for ArcGIS, a free download. This add-on does not work with ArcGIS Desktop 9.0. Instead, Service Pack 2 for ArcGIS Desktop 9.0 adds OGC WMS client support into the core product. If you install Service Pack 2, you can access OGC WMS services with ArcView®, ArcEditor™ and ArcInfo®. No other software is required. Services complying with versions 1.0.0, 1.1.0. and 1.1.1 of the OGC WMS specification are supported.

OGC WMS services work in a similar way to ArcIMS® image services. However, there are some differences that you will come across when you use WMS services in ArcGIS. This document shows you how to work with WMS services in ArcGIS and also highlights the differences.

Adding a WMS service into a map

1. In the GIS Servers folder in ArcCatalog™, or in the Add Data dialog in ArcMap™, double-click Add WMS Server:
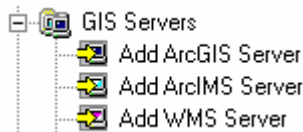
2. In the dialog that appears, enter the URL to the WMS service. The URL you specify for a WMS service needs to be the complete URL, not just the server domain as is the case when you make a connection to an ArcIMS server. All WMS URLs must end with a ? character or, if the URL contains a = sign, a & character. The prefix http:// must be included. Here are two common formats for WMS URLs:

   ```
   http://www.example.com/maps/wms.cgi?
   http://www.example.com/servlet/com.esri.wms.Esrimap?ServiceName=Name&
   ```

   Tip: If you can't connect to the server, first check that the URL has either ? or & at the end.

   Press OK. This will create a connection to the server on which the service is running:

3. Double-click the server connection to see the WMS service it contains:

   When you look inside a WMS server in ArcCatalog, you only see one service. You don't see multiple services as you do in the case of ArcIMS or ArcGIS servers. With OGC WMS, the server and the service are really the same thing, but separate objects have been implemented in ArcCatalog for a connection to a WMS server and the WMS service it contains to match how ArcCatalog handles other servers.

4. Add the WMS service to ArcMap in the usual way; either drag and drop from ArcCatalog or use the Add Data dialog in ArcMap.
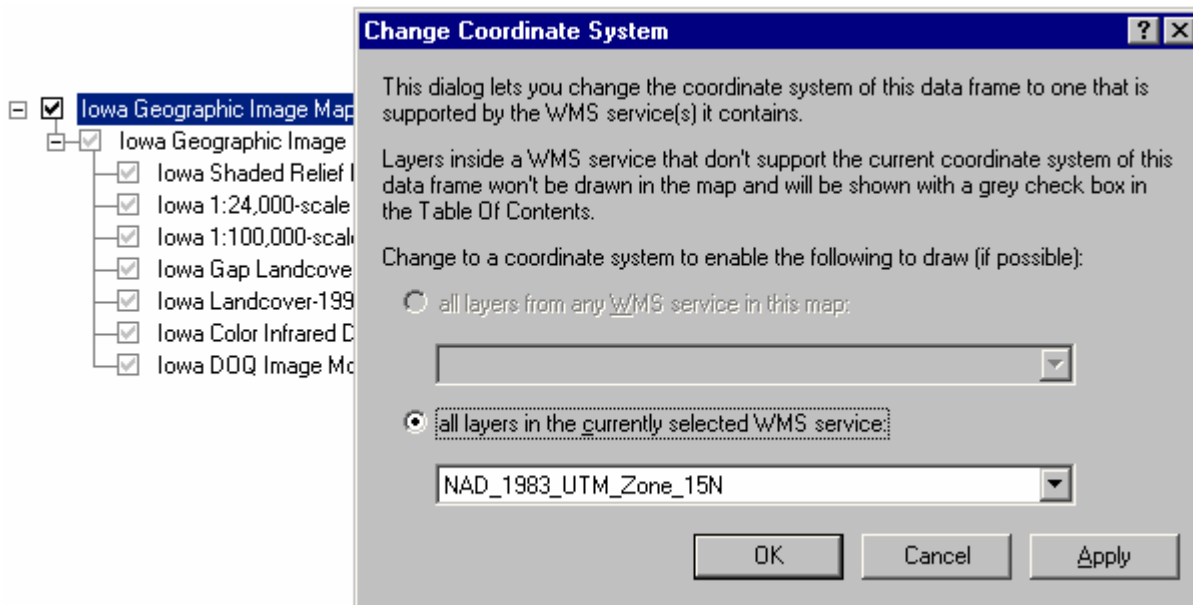
Coordinate systems

■ The layers in a WMS service only support a limited set of coordinate systems, depending on how the service has been configured by its author. In addition, each layer can potentially support a different set of coordinate systems. When you add a WMS service to a map, the current coordinate system of your data frame may not be supported by one or more layers in the service. If this is the case, two things will happen:

- You'll get the standard warning message from ArcMap telling you that the data you are adding has a geographic coordinate system that differs from other data in the map or from the current map projection. (You won't get this message if you have previously told ArcMap not to give you this warning.)

- The layers in the WMS service that don't support your data frame's current coordinate system won't be drawn in the map, and these layers will be shown with disabled check boxes in the table of contents:

To correct this situation you can change the coordinate system of your data frame to one that is supported by the layers in the WMS service. To do this, right-click the WMS service layer in the table of contents and choose the Change Coordinate system command. The dialog that appears allows you to change the coordinate system to one that is supported by the WMS service:

You can also launch this dialog by right-clicking any group or layer inside the WMS service. If you launch the dialog in this way, it will only list the coordinate systems supported by the group or layer that you right-clicked.

If your map contains more than one WMS service, you can check the first option in this dialog to choose a coordinate system that is supported by all the layers in all the WMS services in your map. Depending on which services you are accessing, there may be no coordinate system that is common to all the services. In this case, you won't be able to draw some of the layers and they will be shown with grey check boxes in the table of contents.

The Change Coordinate System command can be used at any time, even if all the layers in the WMS services you are using support the data frame's current coordinate system. For example, if you want to choose a different coordinate system for your data frame, you can use the Change Coordinate System command to do this. This will ensure that the coordinate system you choose will be one that is supported by all the WMS services in your map. You can change the coordinate system of your map in the usual way using the Data Frame Properties dialog, but this doesn't limit your choices to those supported by WMS services in your map and, therefore, may result in some or all of the layers in these services being disabled.

Note: In this release the Change Coordinate System command doesn't work if you are in Layout view.

If you use the Data Frame Properties dialog to change the coordinate system of your map to one that isn't supported by the WMS services currently in the map, you'll get the warning message from ArcMap telling you that the coordinate system you chose has a geographic coordinate system that differs from one or more data sources in the map, and the layers in the WMS services that don't support your data frame's new coordinate system won't be drawn and their check boxes will be disabled.

What you see in the table of contents for a WMS service

■ When you first add a WMS service to ArcMap, its entry in the table of contents is collapsed to save space. Expand the WMS layer in the table of contents to see the individual layers it contains. Unlike ArcIMS image services, the layers that make up a WMS service may be organized into different groups by the author of the service.

■ A WMS service doesn't define which of its layers are visible when you initially access it, so ArcMap automatically turns on the first 20 layers in any WMS service you add to a map. This way you are likely to see a useful map when you first add the service. When you zoom in on a WMS service, bear in mind that you won't necessarily see more detail unless the layers providing more detailed data happen to be in those first 20 layers, or unless you turn those layers on. Similarly, if you view a WMS service in the ArcCatalog Preview tab, the preview will only show you the first 20 layers in the service. For this reason, working with WMS services in the Preview tab is only recommended for quick browsing and checking that a service is working. To explore all the data in a WMS service, add it to ArcMap.

■ Some WMS services do not include legend information about the symbols used by the layers in the service. When legend information is not available, no symbology is shown for the layers in the table of contents. These layers will be listed in the table of contents without expansion controls next to them because there is no legend that can be displayed by expanding them.

In addition, the legends for the layers in WMS services that do provide legend information sometimes cannot be displayed in ArcMap's table of contents. This usually happens when the legend for a layer contains multiple symbols. With WMS services, the legends for layers are transmitted over the Internet as one image containing all the symbols. ArcMap supports legend entries with multiple symbols in its table of contents but expects these entries to contain multiple images—one image per symbol. ArcMap also places a limit on the size of an image it will display in the table of contents. When the image received for a layer in a WMS service exceeds this limit, no legend is displayed for the layer. These layers are therefore listed in the table of contents without symbology and without expansion controls.


■ When a WMS service includes legend information about the symbols used by the layers it contains and the legend image is small enough to be displayed in ArcMap's table of contents (which is usually only the case when the legend contains a single symbol), this symbology is accessible in the table of contents by clicking the expansion controls

next to the layers in the service. The legends for these layers in WMS services are hidden by default in the table of contents. This is because accessing a legend for one layer in a WMS service requires sending a request from ArcMap to that service. Doing this for all the layers in a service by default would take too long because each request must be sent separately.

■ Layers in WMS services that have a scale range are correctly supported by ArcMap in the usual way—you can review the scale range in the Layer Properties dialog, and the check boxes in the table of contents will be disabled when the layers are not drawn because the current map scale is outside this range. However not all WMS services provide this scale range information to clients, even though the layer may have a scale range set in the service and will not be drawn at scales outside this range. When this information isn't provided, ArcMap therefore can't show the scale range in the Layer Properties dialog and the layer's check box won't be disabled in the table of contents, even though the layer has a scale range in the service, and won't appear in the map outside this range.

Choosing which layers in a WMS service will be available

■ By default, when you add a WMS service to ArcMap, all the layers in that service are available for display in the map. The table of contents entry for the service will include all the layers and groups, using the drawing order defined by the author of the service. Some WMS services contain a very large number of layers and are more like data collections than individual maps. You can use the Layers tab in the WMS Layer Properties dialog to configure which layers in the service will be included in its table of contents entry, and specify the order in which they will be drawn:
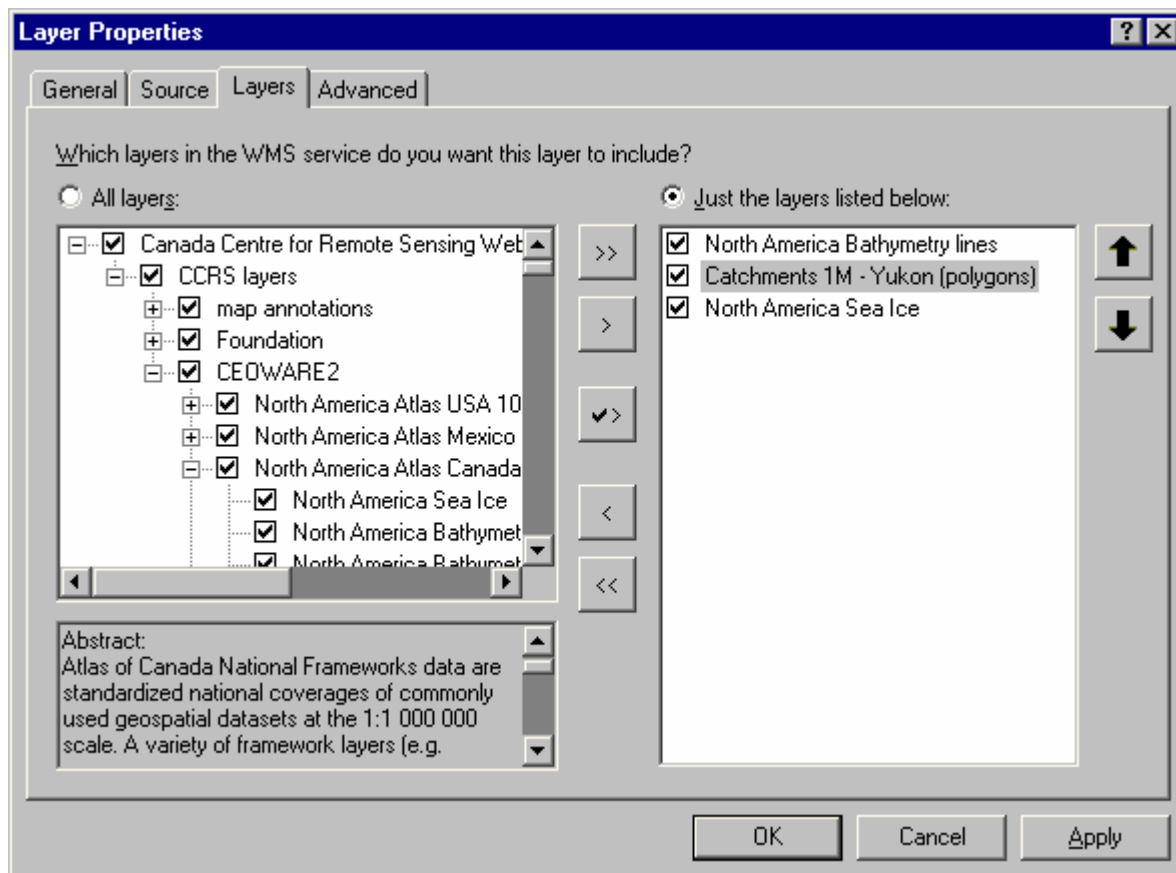
Identifying WMS services in ArcMap

■ When you identify a feature in a WMS service, the results aren't displayed in a tabular grid. Instead, the results are displayed inside an Internet Explorer control embedded in the Identify Results window. This is because the results returned by a WMS service when it is sent an identify request can be in any form. They may be field/value pairs but could also be in HTML or image format. The Identify Results window displays whatever is returned from the service.
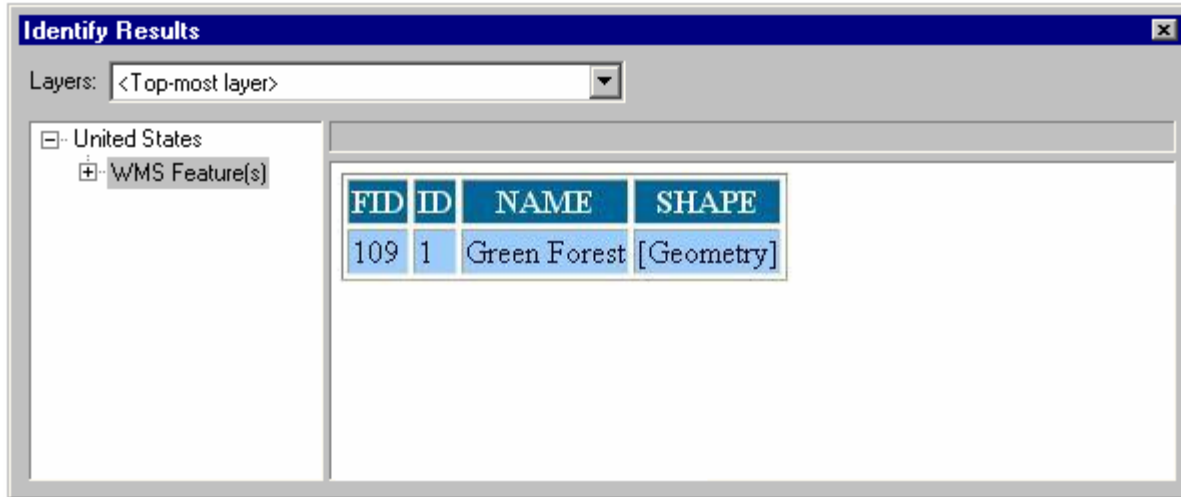
In the screenshot above you will also notice that there is no primary display field for a feature identified in a WMS service layer. The node in the tree representing the features in a WMS service layer is always called 'WMS Feature(s)'.

■ Not all WMS services support the Identify command. A quick way to check whether a particular WMS service supports the Identify command is to add it into an empty map and click on the map with the Identify tool. If the Layers dropdown list in the Identify Results window is empty, the service does not support the Identify command, and none of its layers will be listed in the Layers dropdown list. If the Layers dropdown list defaults to <Top-Most Layer>, the service supports the Identify command, and you will see the its layers listed.

■ When you identify a WMS service layer, the default option, <Top-Most Layer>, doesn't work as expected. When you use this option and click on the map, the Identify command will only identify features from the top-most layer in the WMS service's drawing hierarchy. If there are no features present in the layer at that location, this option does not automatically identify features from layers that are lower in the drawing hierarchy like it normally does. It is recommend that you either use the <Visible Layers> option, which will identify features in any of the visible layers in the WMS service layer, or choose the specific layer you want to identify.

■ In this release, the Identify command does not work properly when the data frame is rotated.

■ Other forms of query are not supported by WMS services, including using the Find command, selecting features interactively or with the Select By Attributes command, and geoprocessing.


How errors are handled

You may sometimes receive an error message from particular WMS services when you add them to a map. As with any live web mapping service based on images, when ArcMap attempts to draw a WMS service in a map, it sends a request for an image to the WMS server providing that service. If the server returns an error instead of an image, ArcMap will display that error message. These error messages, which appear each time you redraw the map, reflect problems with the WMS service and normally can't be remedied in ArcMap. ArcMap displays these messages to warn you that something about the WMS service is not working as ArcMap expects, and also to provide a basic diagnostic capability. However because these errors can vary widely between different WMS servers, it is difficult for ArcMap to tell you exactly what the problem is. As a result, the error messages are fairly generic and the problem

may not be obvious. For example, the error may be caused by a particular layer belonging to the WMS service, or to a particular combination of layers.

If you receive an error message from a WMS service, it doesn't necessarily mean that you won't be able to draw this service in your map. For example, you may be able to tell which layer in the WMS service is causing the problem, in which case you can turn that particular layer off in the table of contents to prevent the error message from appearing. Another example is that some WMS services may return the error "Bounding box has an invalid area" when you draw them at a very small scale, but when you zoom in to larger scales they draw correctly and the error message won't appear. In this situation, you can specify a scale range for the WMS service layer in the usual way (in the General tab of the Layer Properties dialog), so that the layer is not drawn at very small scales. This will prevent the error messages from appearing when the layer can't be drawn. If you receive an error message that you are not able to work around, the only way you can prevent it from appearing is by unchecking the WMS service in the table of contents, or removing it from your map.

Information for advanced users

■ In ArcCatalog, double-click a WMS service to access its properties. In the WMS Services Properties dialog you can browse through all the groups the service contains and review the capabilities information for each layer, including the abstract and information about the bounding box, scale range, supported spatial reference systems (SRS), and whether or not legend information is available:
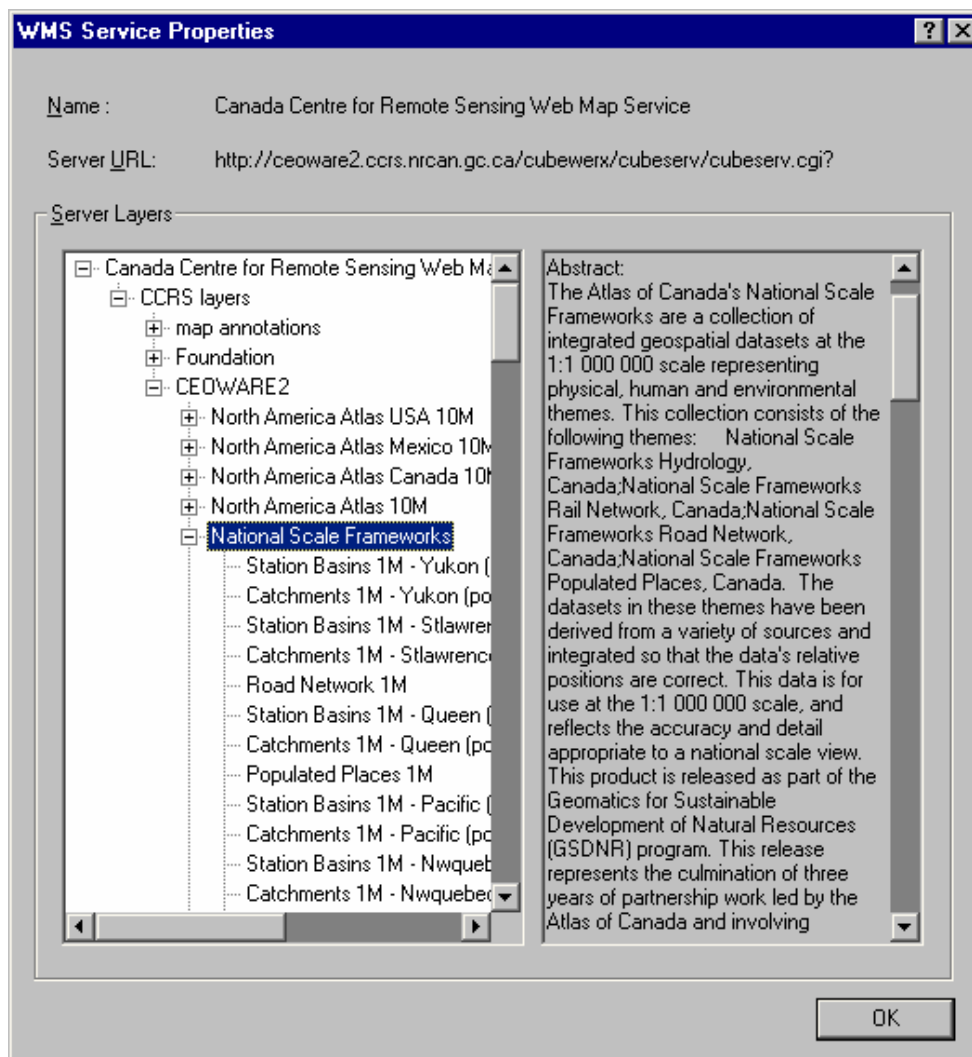
This information is also accessible in the Layers tab of the WMS Service Layer Properties dialog in ArcMap.

■ ArcGIS doesn't support client-side customization of the symbology in WMS services through the OGC Styled Layer Descriptor (SLD) specification.

Support in other ArcGIS applications

■ WMS services are not supported in ArcGlobe™ with Service Pack 2. Support for WMS services in ArcGlobe is planned for the 9.1 release. (ArcScene™ doesn't support image-based map services, such as ArcIMS image services, so WMS services won't work in ArcScene.)

■ You can use ArcGIS Publisher to create a PMF containing WMS service layers. These layers are accessible when the PMF is opened inside a standalone installation of ArcReader™ if the separately available Service Pack 2 for standalone ArcReader has been applied to the installation.

Sample WMS services

(ESRI doesn't guarantee the availability of Web sites created and maintained by third parties and is not responsible for their content. Inclusion in this list doesn't imply endorsement by ESRI of any particular product, company, or service. The names, maps, and Web sites listed below are copyrighted and may include registered trademarks.)

Atlas of Canada:
    http://atlas.gc.ca:80/cgi-bin/atlaswms_en?

Canada Centre for Remote Sensing web map server:
    http://ceoware2.ccrs.nrcan.gc.ca/cubewerx/cubeserv/cubeserv.cgi?

DEMIS World Map:
    http://www.demis.nl/mapserver/request.asp?

ESRI Population Density (Geography Network℠ service):
    http://www.geographynetwork.com/ogc/com.esri.ogc.wms.WMSServlet?ServiceName=ESRI_Pop&

California Spatial Information Library:
    http://casil.ucdavis.edu/cgi-bin/mapserv42?map=/usr/share/gforge/www/mapsurfer/drg-index-wms.map&version=1.1.0&

Intergraph World Map:
    http://maps1.intergraph.com/wms/world/request.asp?

United States Geological Survey EROS Data Center GISDATA server:
    http://gisdata.usgs.net/servlet/com.esri.wms.Esrimap?servicename=USGS_WMS_REF&

London CABI Pilot:
    http://cabi.graphdata.co.uk/webmapservice/planaccesswms.asp?

Deegree Initiative, University of Bonn:
    http://demo.deegree.org:8080/deegree/wms?

United States Department of Agriculture Natural Resources Conservation Service and Iowa State University:
    http://komodo.gis.iastate.edu/server.cgi?wmtver=1.0&

Western Australia:
    http://atlas.walis.wa.gov.au/servlet/com.esri.wms.Esrimap?

Delaware DataMIL:
    http://datamil.udel.edu/servlet/com.esri.wms.Esrimap/census2k?

Finding additional WMS services

For additional WMS services, search the Geography Network (http://www.geographynetwork.com) or the Geospatial One-Stop Web site (http://www.geodata.gov). On either site, search for content type = "Live Data & Maps" and specify "WMS" as the keyword. In the search results, click Details next to any WMS service entry and copy the URL found at the bottom of the Details listing.

Note that the URLs for WMS services that you find on the Web may not end with the ? or & character required by ArcGIS as described at the beginning of this document. In this case, add the appropriate character at the end of the URL manually after pasting it into the Add WMS Server dialog. Add the ? character, unless the URL contains a = sign, in which case add the & character.

Technical support articles

The following Knowledge Base article, 27825, is being prepared in which we will reference all the technical support articles that are added to the Knowledge Base about WMS support:

http://support.esri.com/index.cfm?fa=knowledgebase.techarticles.articleShow&d=27825