

Using the AlaskaMapped Web Map Service (WMS) in ESRI ArcGIS 9.2



Version 1.2, November 6, 2007

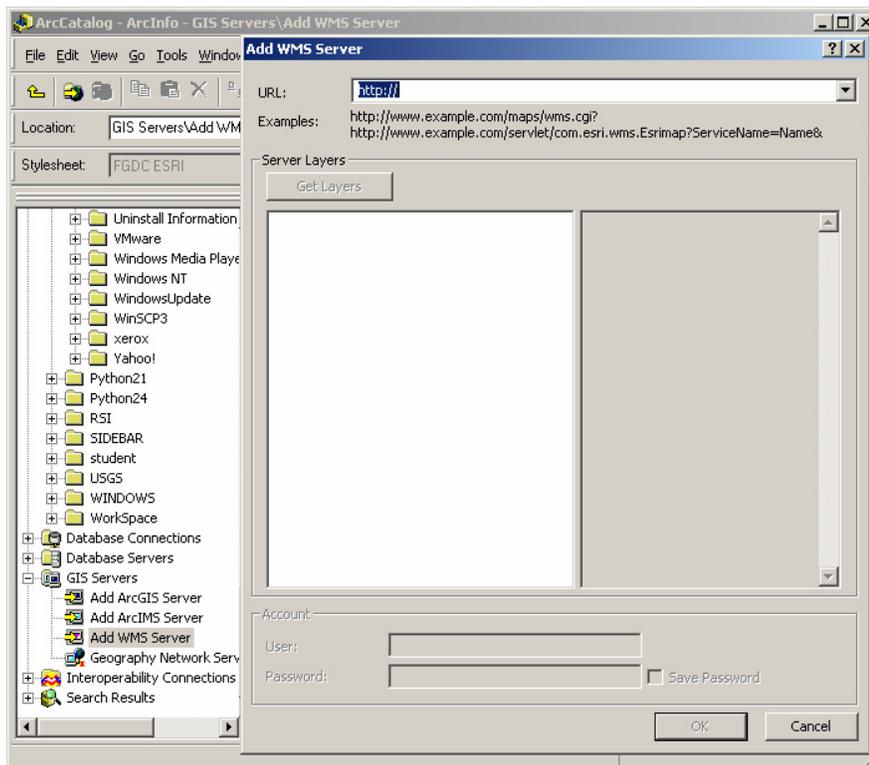
Produced by the Geographic Information Network of Alaska, www.gina.alaska.edu

There are several ways to bring a Web Map Service (WMS) into ArcGIS. This tutorial will cover adding a connection to a wms url using [ArcCatalog](#), [ArcMap](#) and via downloadable [ArcGIS layer files](#).

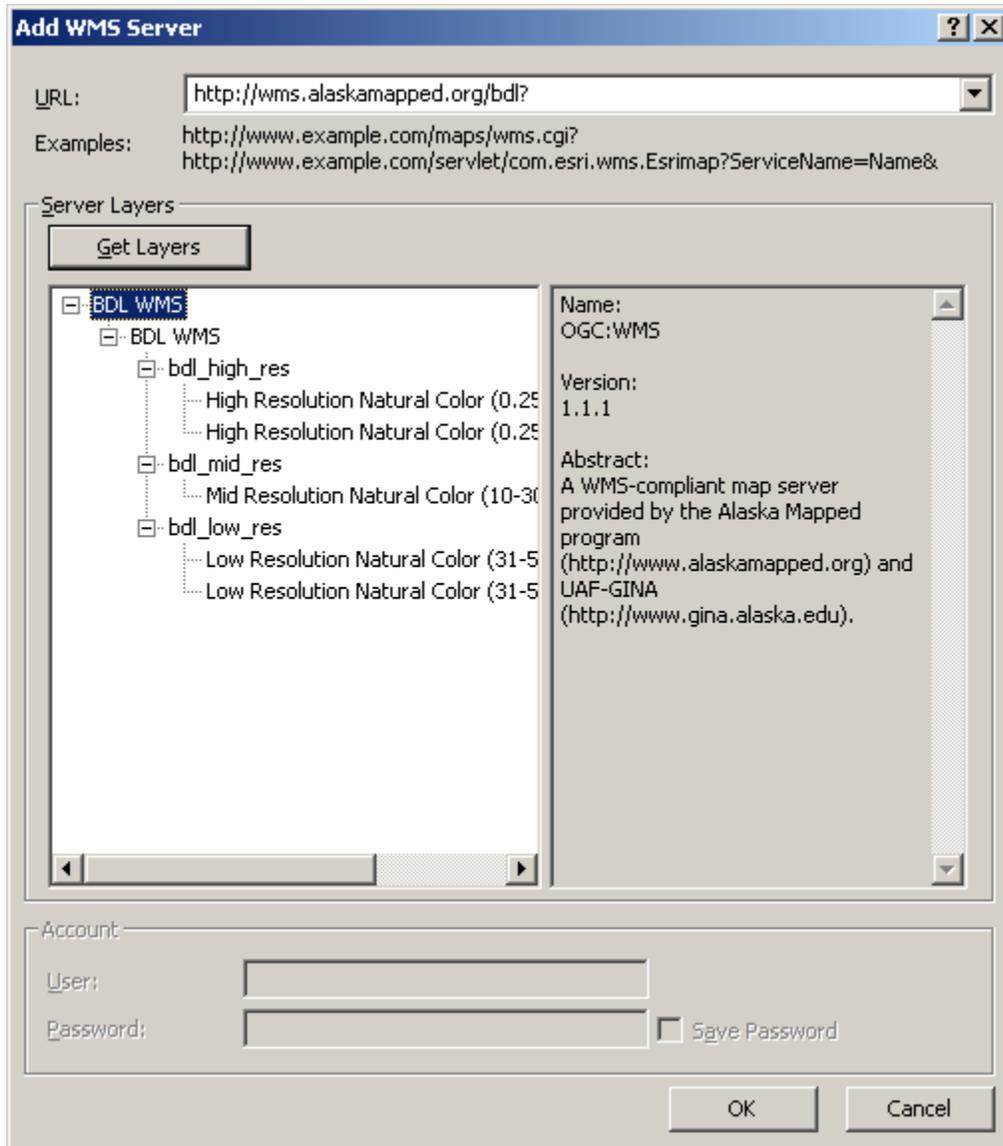
The second and optional section of this tutorial covers incorporating a [Web Feature Service \(WFS\) in ArcGIS](#) using the Data Interoperability Extension. The WFS can be used to discover metadata pertaining to ortho imagery being served through the AlaskaMapped BDL (Best Data Layer) WMS.

First, we'll add a connection to a wms using ArcCatalog. [Back to the Top](#)

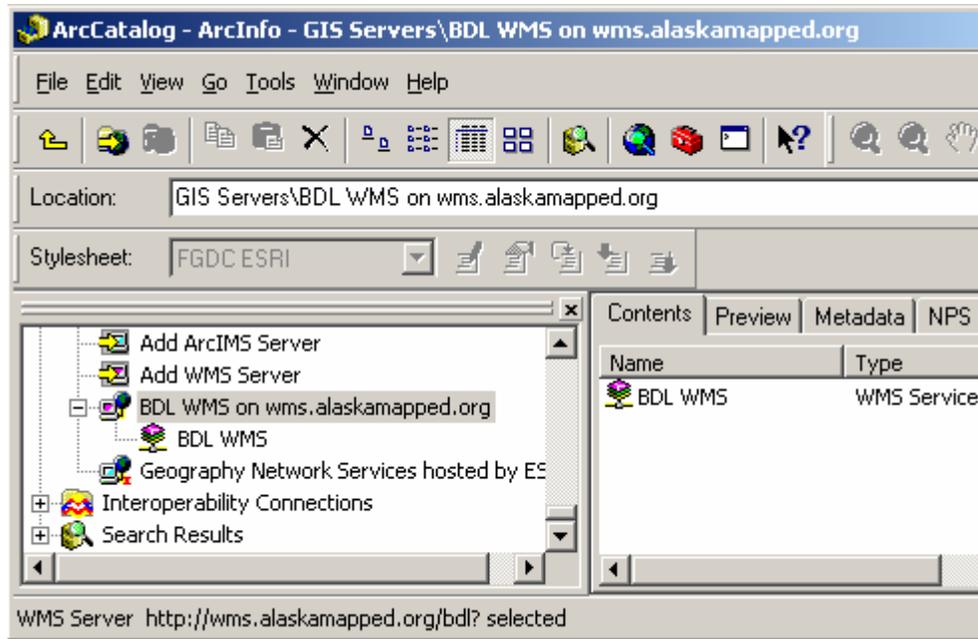
1. Launch ArcCatalog and scroll to the bottom of the catalog tree on the left hand side of the application window.
2. Expand GIS Servers and double-click on Add WMS Server to launch the Add WMS Server dialog.



3. Type the URL for the Best Data Layer Web Map Service (BDL WMS) in the URL: window, then click the Get Layers button. The BDL WMS url is <http://wms.alaskamapped.org/bdl>



Once the wms is found, all available layers maintained by the service will be listed in the Server Layers window of the Add WMS Server dialog. Click OK to add the WMS to your ArcGIS working environment. The service will be listed in the ArcCatalog tree until you manually remove it, as well as be accessible to ArcMap using the Add Data button, which we will cover in the next few steps.



Example of the BDL WMS after adding to ArcCatalog

Some background about the BDL WMS:

The BDL (Best Data Layer) is the repository for the Alaska Statewide Digital Mapping Initiative (SDMI). More information about SDMI can be found at <http://www.alaskamapped.org>. The goal of BDL WMS is to provide open access to the most current, publicly available orthorectified imagery anywhere across the entire State of Alaska. The WMS format is an open source protocol defined by the Open Geospatial Consortium (OGC, <http://www.opengeospatial.org>) and can be implemented in a variety of mapping software platforms, not just ESRI ArcGIS.

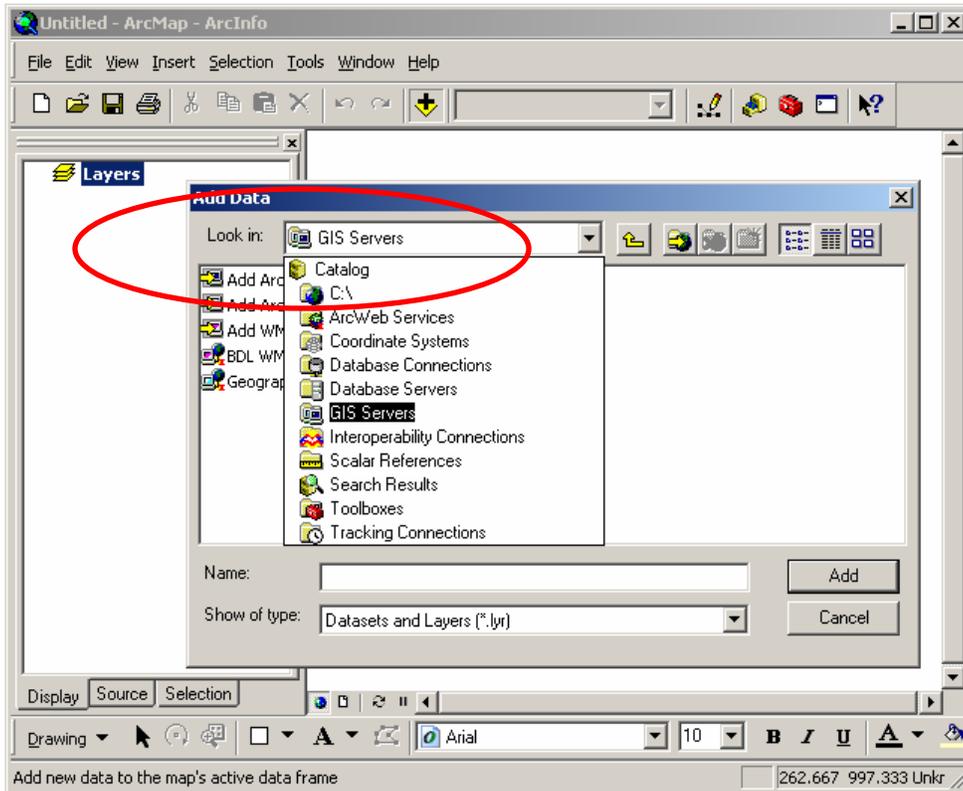
*Currently, there are two additional WMS available through AlaskaMapped; one named **Extras** containing a variety of raster datasets that are in frequent demand among end-users of geospatial information (i.e. USGS Digital Raster Graphics, USGS National Elevation Dataset Shaded Relief, etc...), and another named **Charts** containing the full listing of NOAA Nautical Charts for the State of Alaska (not suitable for navigation). These are at the following URLs:*

Extras: <http://wms.alaskamapped.org/extras>

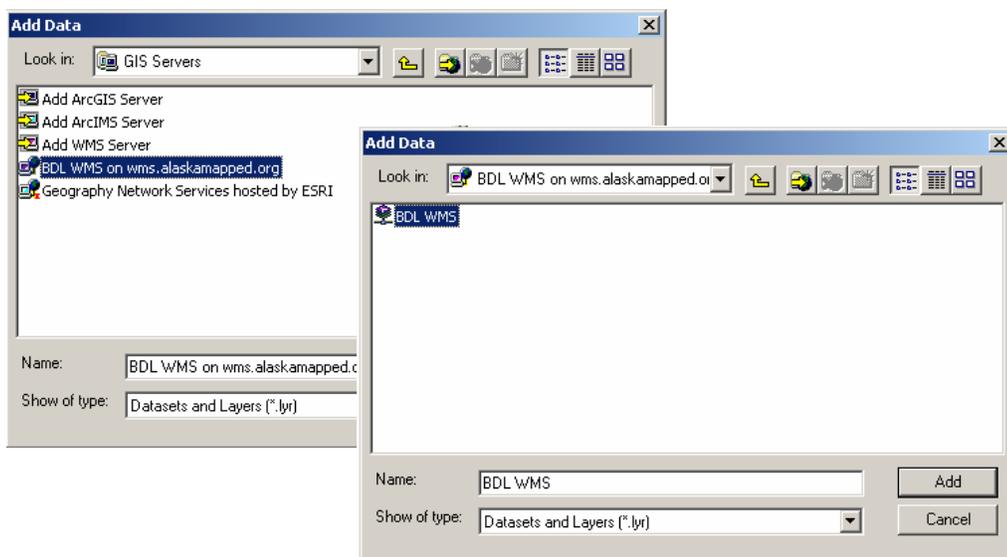
Charts: <http://wms.alaskamapped.org/charts> and

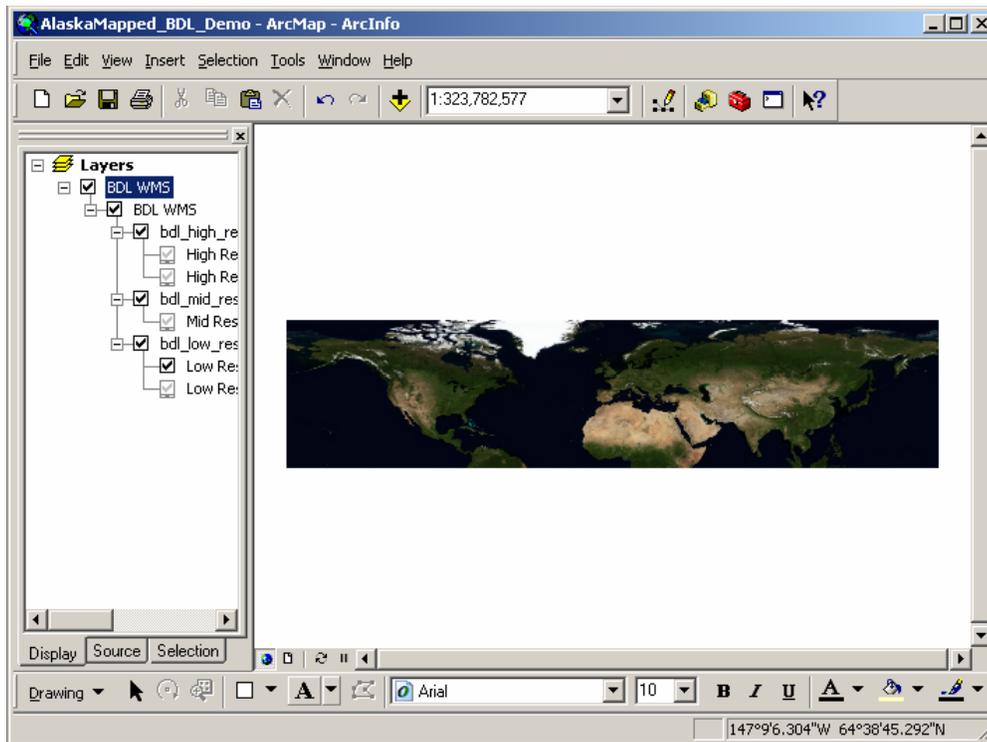
http://wms.alaskamapped.org/charts_nc (nc = not cropped)

4. Launch ArcMap and click the Add Data button . Set the Look in: pull-down to GIS Servers.



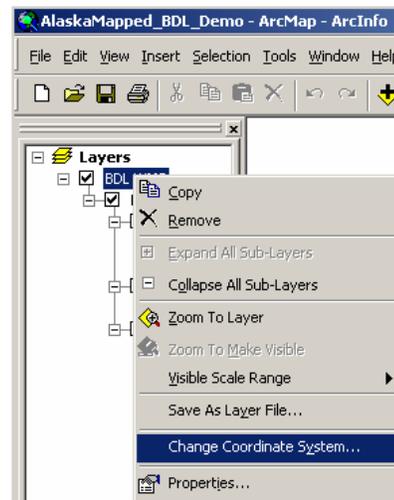
5. Double-click the BDL WMS on wms.alaskamapped.org connection that you established in the previous step to display its contents. Next, select BDL WMS then click the Add button to load the BDL WMS grouped layer into ArcMap.





Example of the BDL WMS after adding to ArcMap

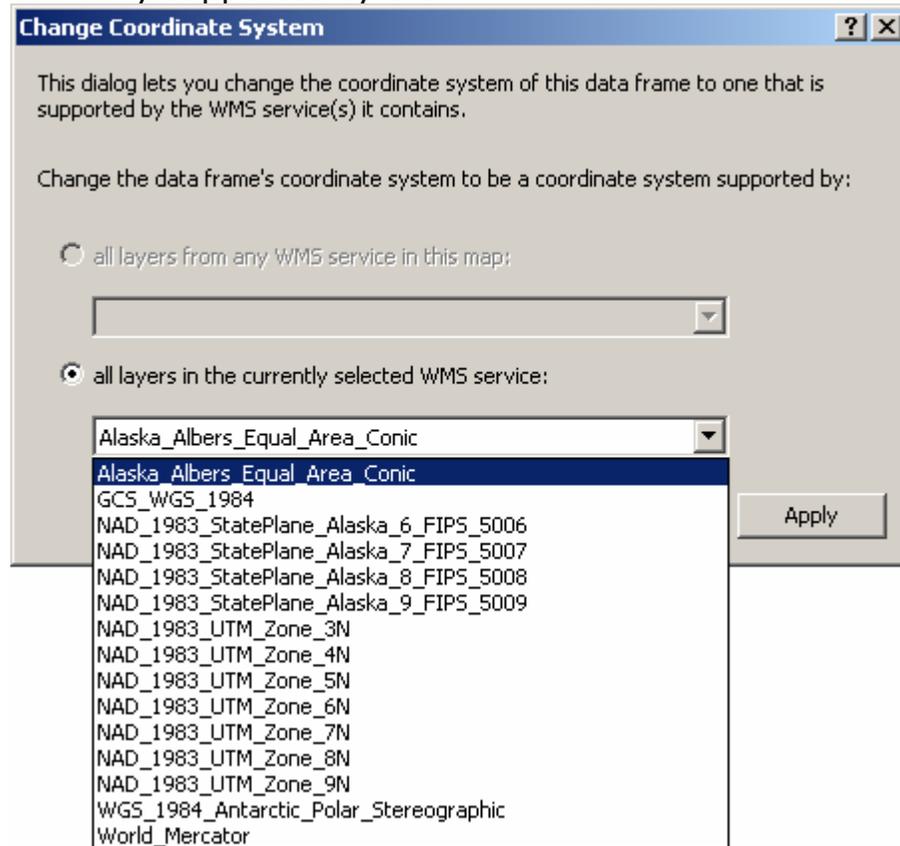
- Note: If the BDL WMS is the first layer you've added to your ArcMap session, it will be read by ArcMap in the Geographic WGS84 spatial reference. This can easily be changed using either the Coordinate System tab of the Data Frame Properties, or the Change Coordinate System command located on the BDL WMS layer context menu. The BDL WMS supports a wide range of coordinate systems commonly used in Alaska.



We will use the layer context menu to set our spatial reference to Alaska Albers Equal Area Conic, NAD 83 Datum, Map Units Meters.

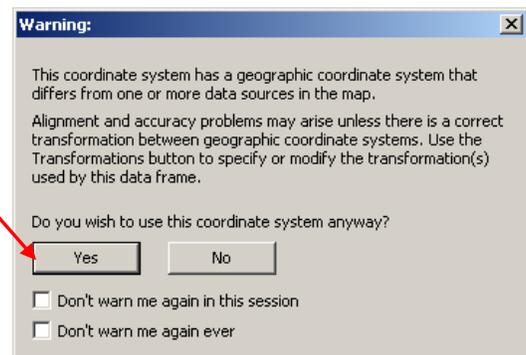
First, right-click on the BDL WMS layer name in the Table of Contents and select the Change Coordinate System command to launch the Change Coordinate System dialog. Next, click on the pull-down arrow under the "all layers in the currently selected

WMS service: option to view the list of coordinate systems currently supported by the BDL WMS.

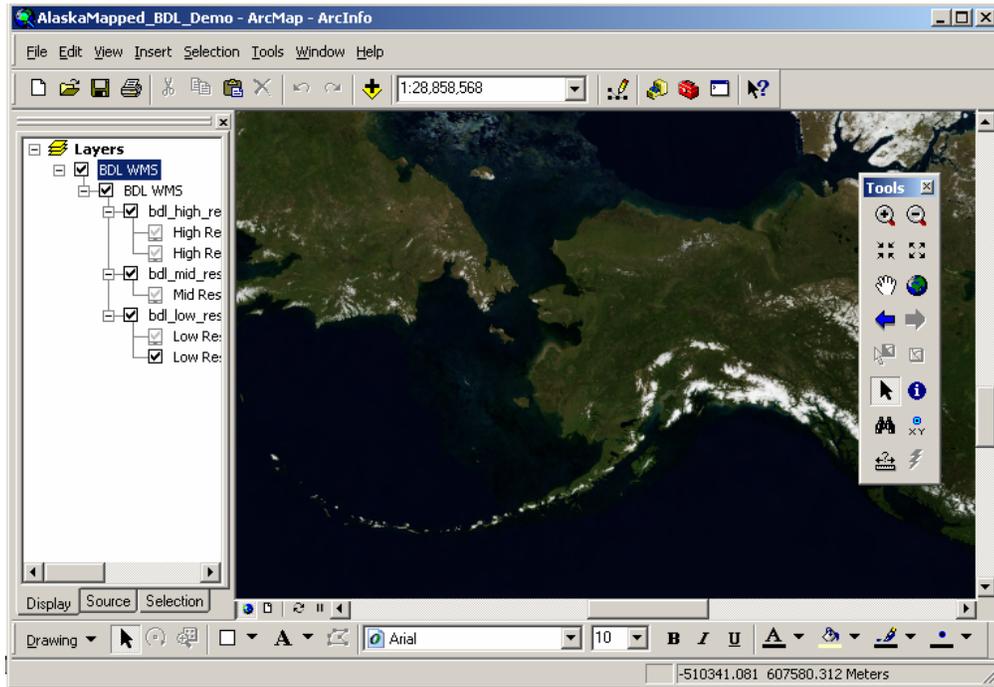


Select the desired coordinate system, Alaska_Albers_Equal_Area_Conic for the purpose of this tutorial, click Apply, then click OK (or just click OK which performs the Apply task and dismisses the dialog at the same time).

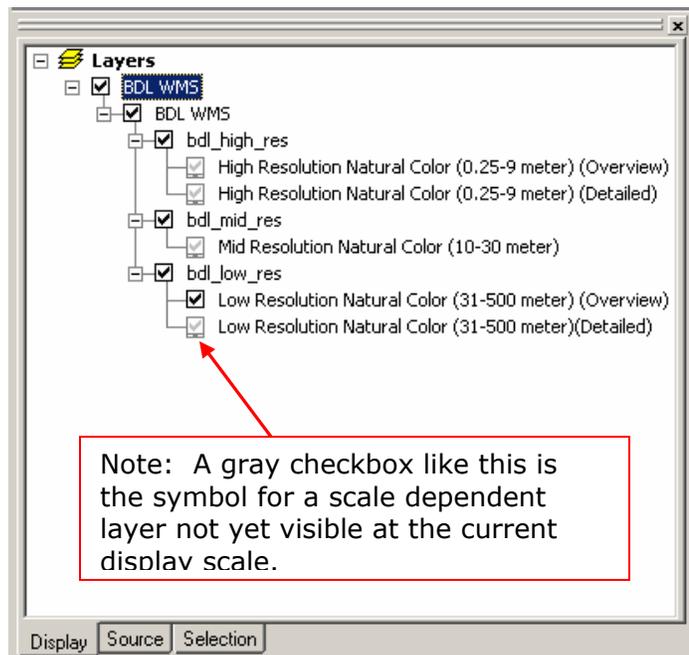
Click the Yes button when the Warning dialog informs you that the coordinate system you have chosen varies from data sources in the Map.



Use the Zoom In tool  to click and drag a box around the State of Alaska. When the display refreshes, your view should resemble the example below (note that your scale may vary depending on the pixel resolution of your monitor and the size of your ArcMap application window).

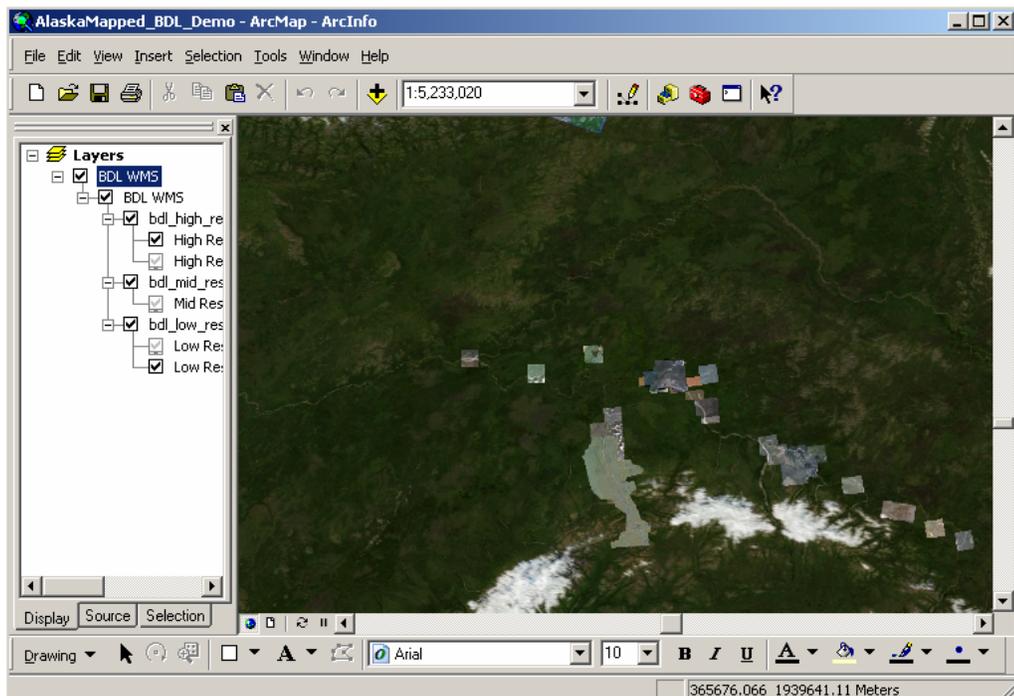


- Take a moment to expand and scroll through the Table of Contents (TOC, located on the left side of the ArcMap application window by default). Notice the different levels of resolution available in the BDL WMS. Also notice that scale dependency has been built into the BDL WMS, meaning that layers will be made visible only at appropriate scales. In this example, the Low Resolution Natural Color layer is the only



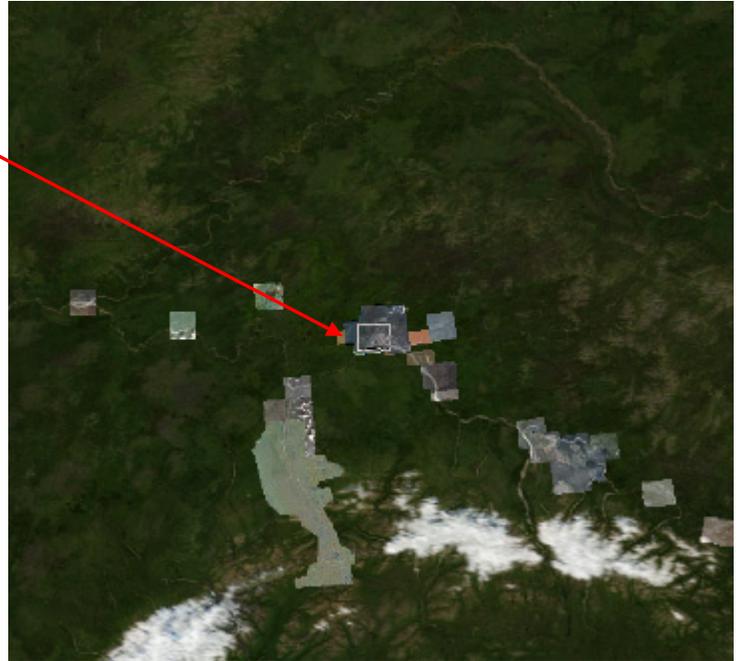
appropriate layer for display when viewing the entire State of Alaska.

8. Again using the Zoom In tool , click and drag a box around the Interior region of Alaska (similar to the box shown in the example to the right). When the display refreshes, it should look comparable to the example below.

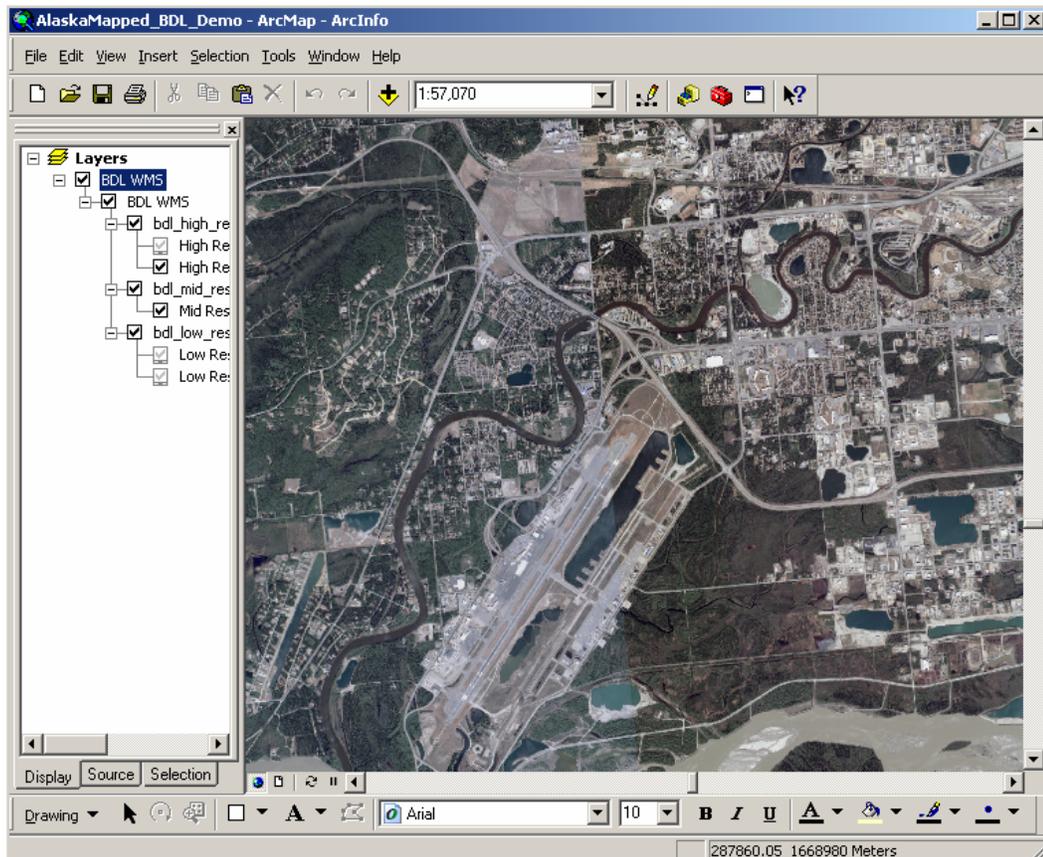


The current display scale is now such that the BDL WMS renders the High Resolution Natural Color Overview, but not the Mid Resolution. This is intentional and designed to flag the user to the fact that more data is available at higher resolutions. This also visually identifies for the user the extent of higher resolution data holdings available through AlaskaMapped and the SDMI.

9. Using the Zoom In tool once again, click and drag another box around the City of Fairbanks similar to the example on the right. If you don't get the zoom quite right the first time, feel free to use the Zoom Out tool or the Zoom to Previous tool and try again. For the purpose of this tutorial, you should try to achieve about the same display extent as is shown in the example below (centered on



Fairbanks International Airport). When you finish the tutorial, we encourage you to explore not only all of the data maintained in the BDL WMS, but the Extras and Charts WMS as well.

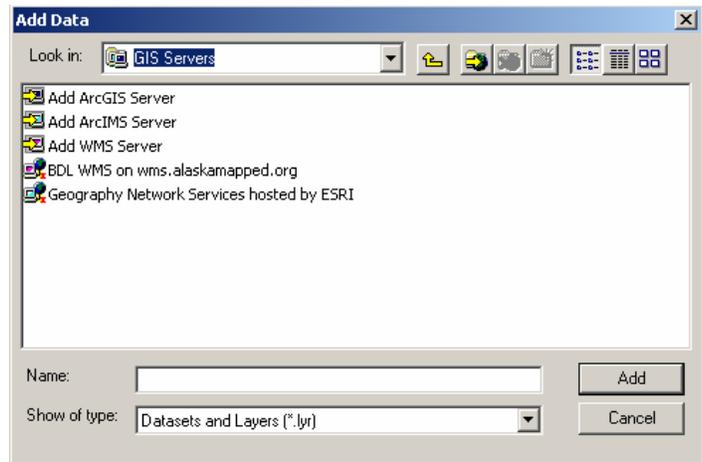


10. Now would be a good time to save the map document. Under the File menu, select the Save As command. Navigate to the C:/student/AlaskaMapped/TutorialData directory, name the map document AlaskaMapped_Tutorial.mxd and click the Save button.

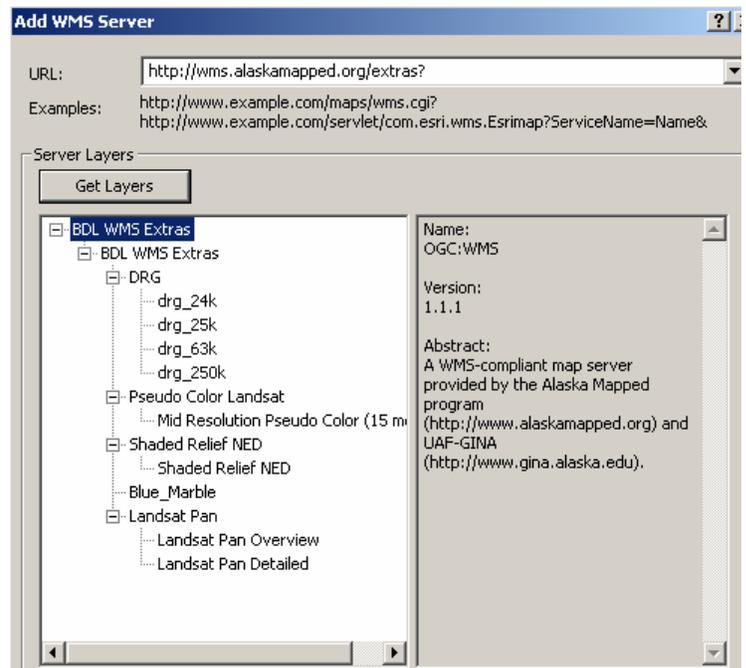
11. Click the Save button  to save the map document.

Now we'll create a connection to a wms using ArcMap.
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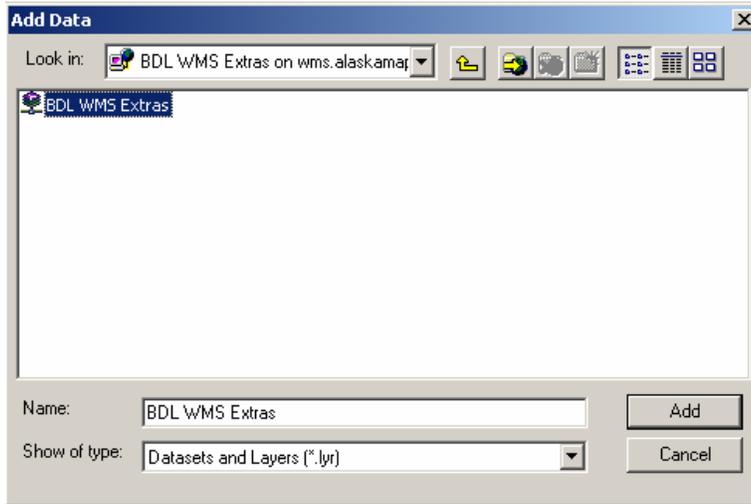
12. Next we'll add the AlaskaMapped Extras WMS directly from ArcMap. Click the Add Data button and set the Look in: pull-down to GIS Servers. Notice that the BDLWMS on wms.alaskamapped.org is still listed. Double-click on Add WMS Server to launch the Add WMS Server dialog from ArcMap.



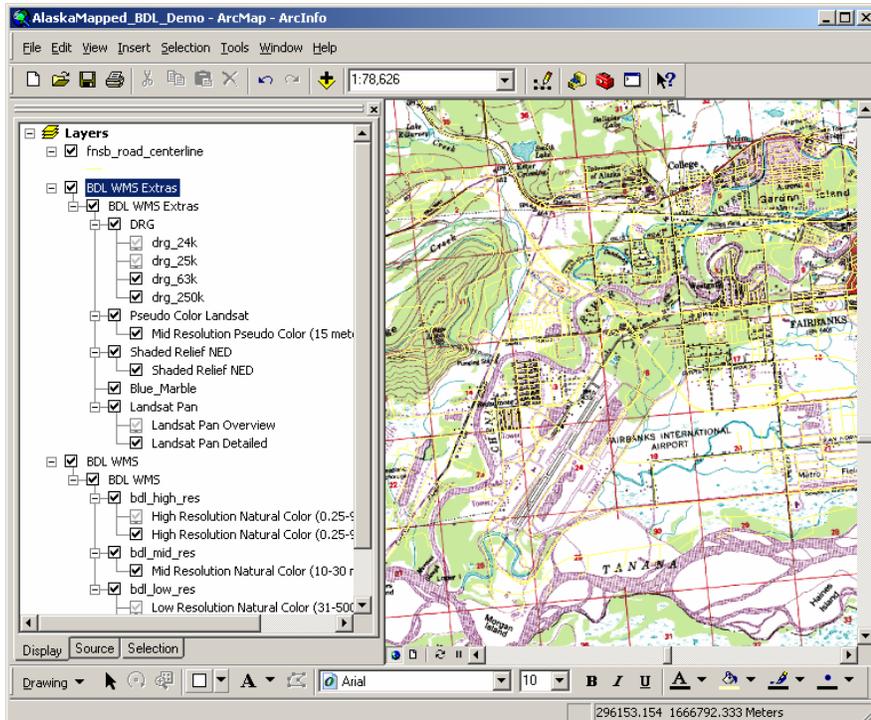
Type the URL for the Extras WMS into the URL: window, then click the Get Layers button to display the available layers maintained in the Extras WMS (shown in the example to the right). Click the OK button to add the connection to the ArcMap Add Data dialog, then double-click on BDL WMS Extras on wms.alaskamapped.org in the Add Data dialog, select BDL WMS Extras and click the Add button to load the



BDL WMS Extras group layer to your ArcMap document.

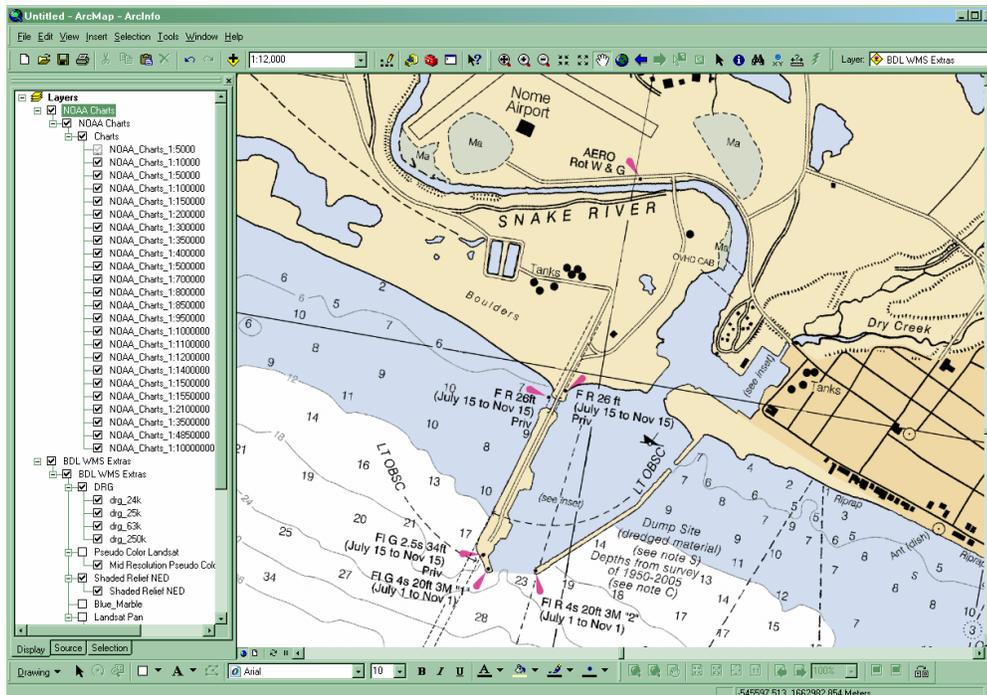


13. If you haven't changed the scale of your map document, the Extras WMS should now be displaying the USGS 1:63,360 topographic quad map of Fairbanks. Expand the BDL WMS Extras layer in the ArcMap Table of Contents to view the data available in this WMS.



Download and add an ArcGIS layer file that references a WMS [Back to the Top](#)

- The easiest method to bring any or all of the AlaskaMapped WMS into ArcMap is to simply download the ArcGIS Layer File for the WMS (BDL, Extras, Charts, or Charts NC) and Add it to ArcMap using the Add Data button. We will demonstrate this method using the Charts WMS that we described earlier in this tutorial. First, download the AlaskaMapped NOAA Charts WMS layer file (www.alaskamapped.org/lyr/noaa_charts.lyr) and save it to the directory of your choice.
- Using the Add Data button in ArcMap, browse to the AlaskaMapped NOAA Charts.lyr file you just downloaded and add it to ArcMap. Zooming in on the Airport in Nome, Alaska at a scale of $\geq 12,000$ should render a map display similar to the example below.



Use the following links to download layer files for each of the AlaskaMapped WMS:

www.alaskamapped.org/public_docs/lyr/bdl.lyr

www.alaskamapped.org/public_docs/lyr/extras.lyr

www.alaskamapped.org/public_docs/lyr/noaa_charts.lyr

www.alaskamapped.org/public_docs/lyr/noaa_charts_nc.lyr

16. This concludes the AlaskaMapped WMS ArcGIS Tutorial.

You may continue on optional WFS Tutorial using the Data Interoperability Extension to ArcGIS 9.2.

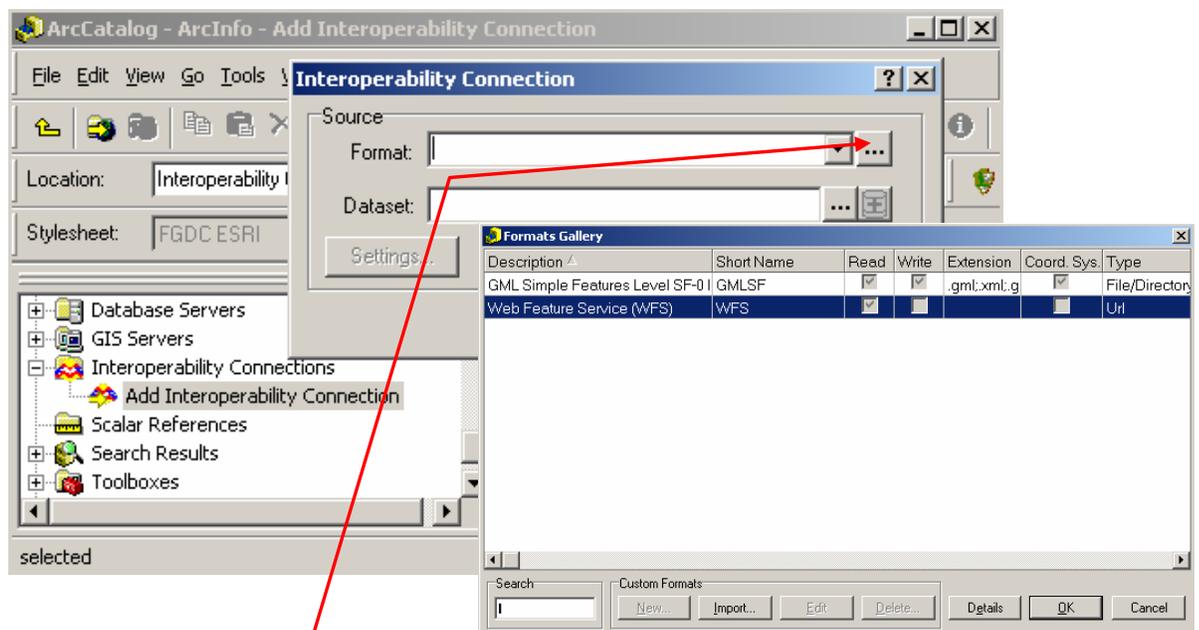
Using the AlaskaMapped Web Feature Service (WFS) in ArcGIS

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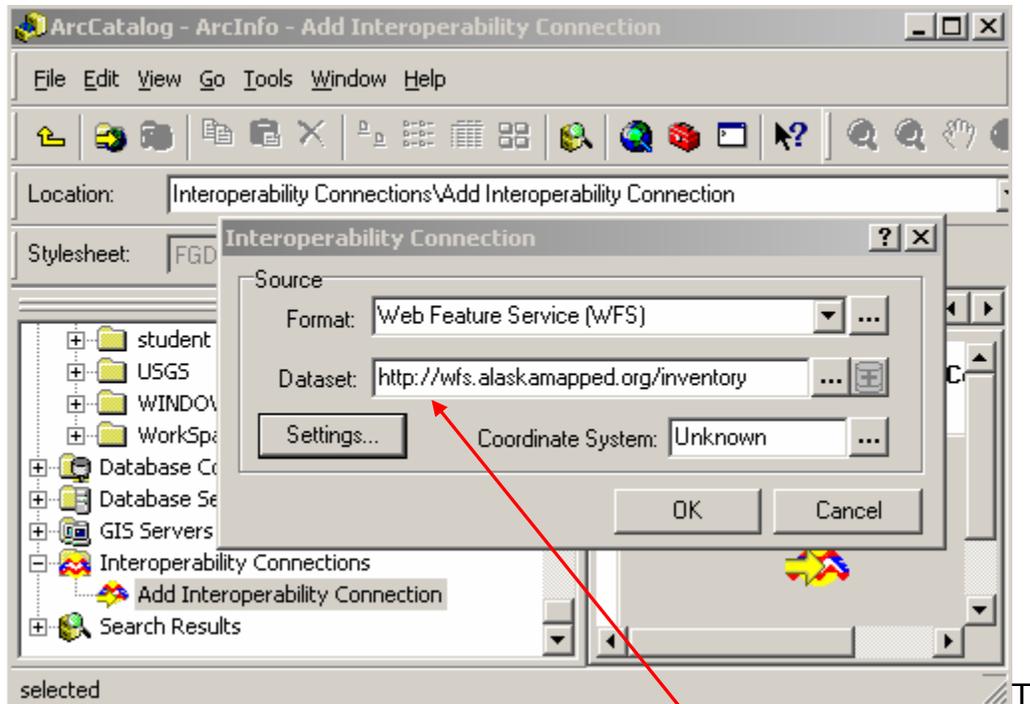
The following (optional) AlaskaMapped Web Feature Service (WFS) portion of this tutorial requires the ESRI Data Interoperability Extension. Please keep your ArcMap document open if you are continuing on to the next section.

17. Launch ArcCatalog if you don't still have it running.

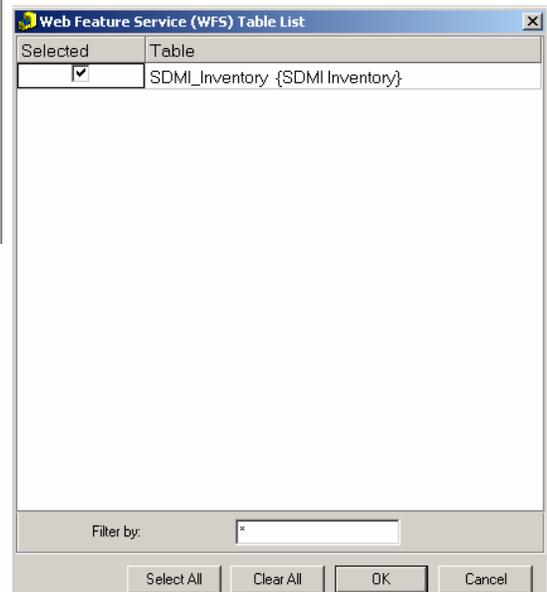
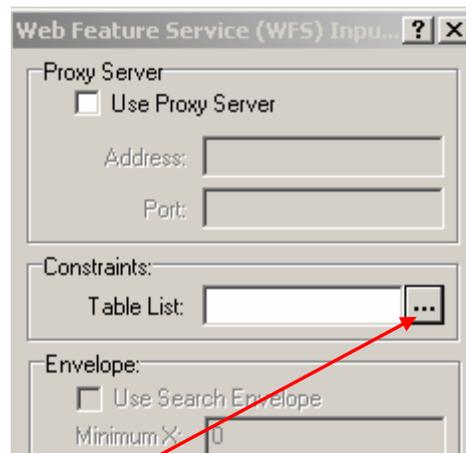
18. In ArcCatalog, scroll down to the Interoperability Connections entry towards the bottom of the catalog tree. Expand Interoperability Connections and double-click on Add Interoperability Connection to launch the Interoperability Connection dialog.



19. Click the ellipsis  next to the Format: window on the Interoperability Connection dialog to launch the Formats Gallery of the Data Interoperability extension. Select the Web Feature Service entry and click the OK button.



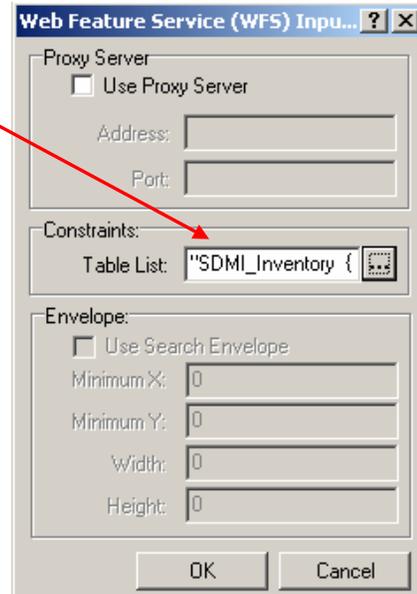
Type the URL for the AlaskaMapped WFS <http://wfs.alaskamapped.org/inventory> into the Dataset: window as is shown in the example above, then click the Settings button.



- Click the ellipsis next to the Table List: window under the Constraints: section of the Web Feature Service (WFS) dialog. This may take some time, but the Web Feature Service (WFS) Table List will eventually load.

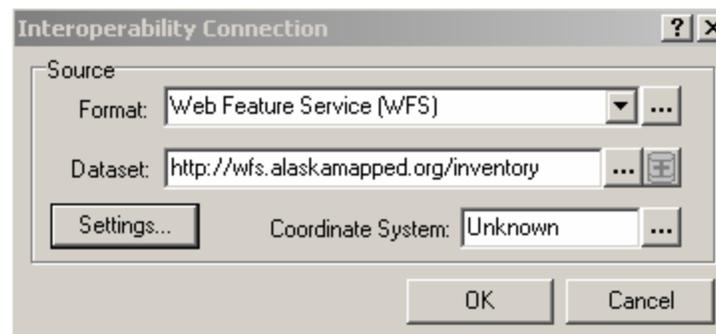
21. Check the Selected box to the left of the SDMI_Inventory item as in the example above, then click the OK button.

22. Ensure that the SDMI_Inventory is loaded into the Table List of the Settings dialog, then click OK.



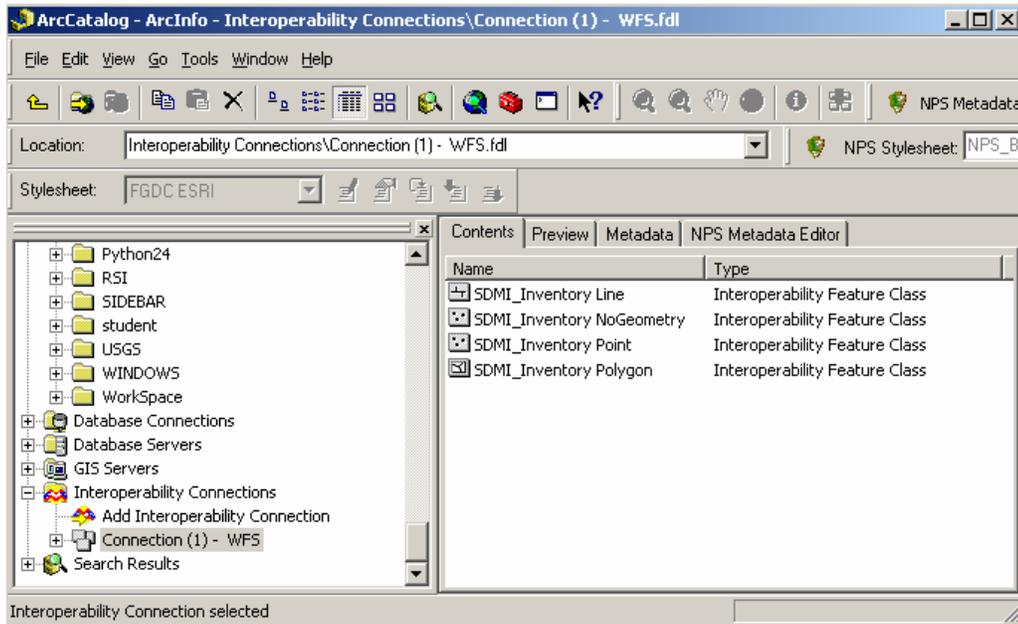
23. The coordinate system for the AlaskaMapped WFS is built into the service. It will NOT function correctly if you specify the coordinate system in the Interoperability Connection dialog.

Note: Leave the Coordinate System: window of the Interoperability Connection dialog intentionally set to **Unknown**. Your dialog should look exactly like the example below.



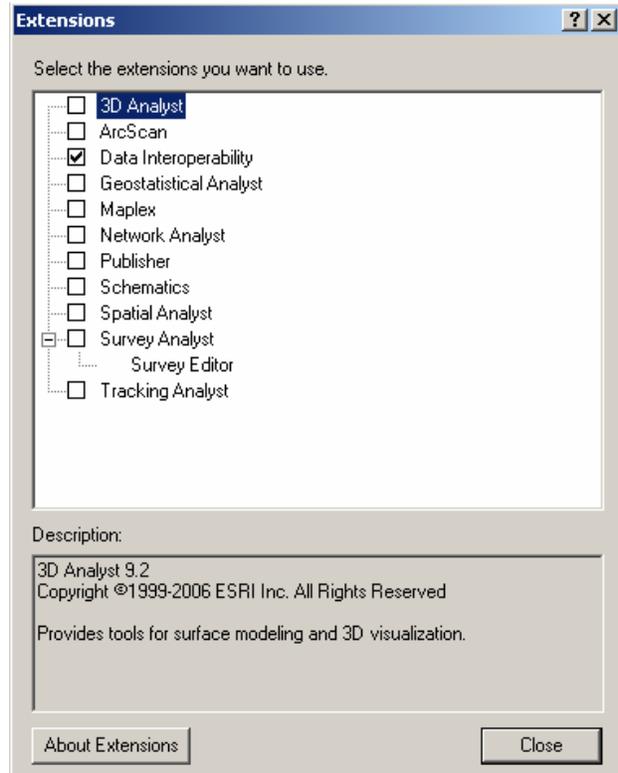
Click OK to complete the connection to the AlaskaMapped WFS Inventory. It will be added to the ArcCatalog tree under Interoperability Connections as Connection (1) – WFS.

24. Expand Connection (1) – WFS in the ArcCatalog tree to view its contents.

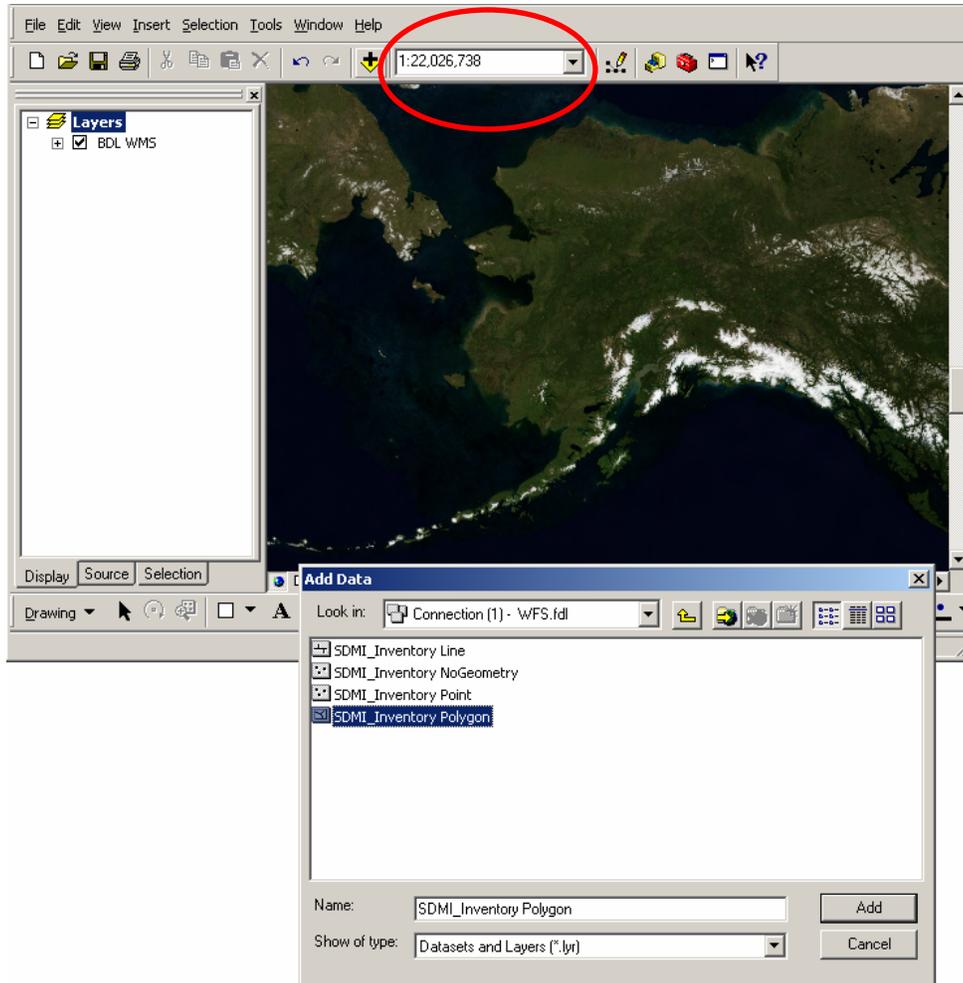


25. Minimize the ArcCatalog application window and return to ArcMap. If you closed ArcMap earlier, launch a new ArcMap document and open the C:/student/AlaskaMapped/TutorialData/AlaskaMapped_Tutorial.mxd map document you saved earlier.

26. In ArcMap, under the Tools menu, select the Extensions command to launch the Extensions dialog. Ensure that the Data Interoperability extension is checked, then click Close to dismiss the Extensions dialog.

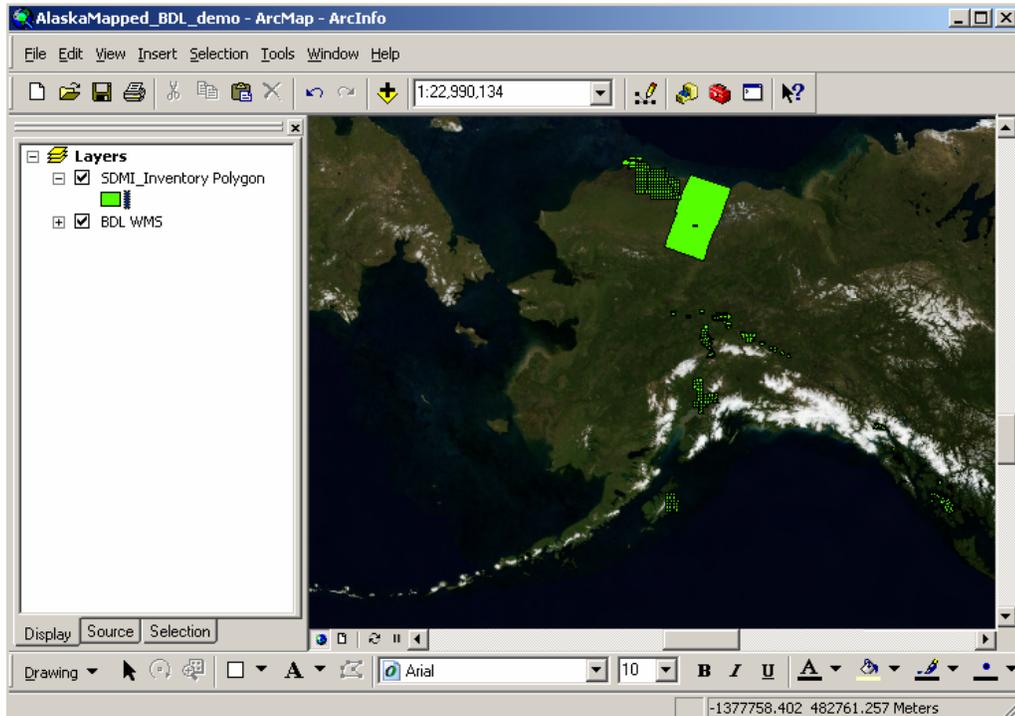


27. Uncheck the visibility for both the fnsb_road_centerline.shp layer and the BDL WMS Extras layer in the ArcMap Table of Contents.
28. Using the Data Frame Scale combo-box on the ArcMap Standard Toolbar (circled below), or the Zoom Out tool , or the navigation tool of your choice, zoom out to an appropriate scale at which you can once again view the entire State of Alaska.



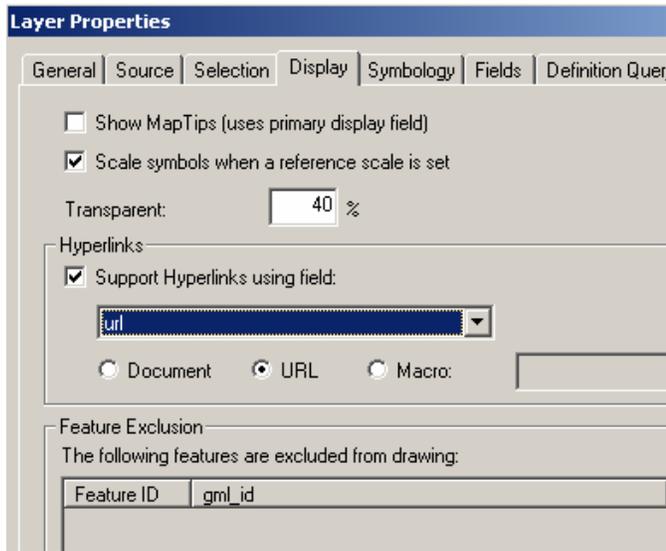
29. Click the Add Data button and set the Look in: window to Interoperability Connections. Double-click the entry for Connection(1) – WFS.fdl, select the SDMI_Inventory Polygon layer and click the Add button (refer to the example above).

30. Click Close on the Geographic Coordinate System Warning, again because the difference between WGS84 and NAD83 is negligible enough that we don't need to apply a geographic transformation in ArcGIS.



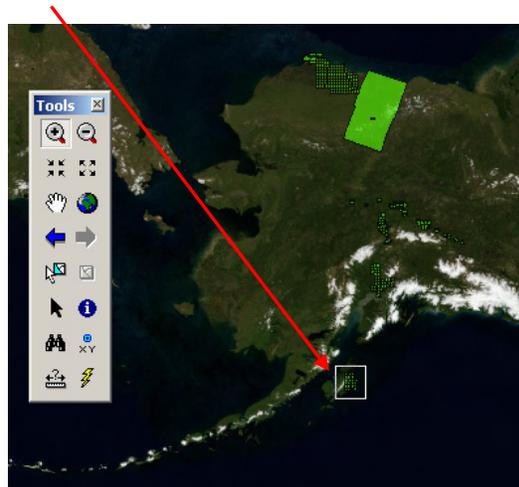
The SDMI_Inventory Polygon layer contains a footprint (outline) polygon for all ortho image tiles maintained in the AlaskaMapped BDL WMS, as well as minimum metadata stored in the form of the attributes of each polygon which pertain to each ortho image tile being referenced by an Inventory polygon. These data are a live connection to the database server hosting the BDL WMS and are created on-the-fly from the bounding coordinates of every image tile that has been ingested into the service.

31. Double-click on the SDMI_Inventory Polygon layer name in the Table of Contents to launch its Layer Properties dialog, then go to the Display tab. Set the Transparent: setting to 40%, then check the Support Hyperlinks using field: option and set the pull-down to the url option. Finally, click the URL radio button in the Hyperlinks section of the Layer Properties dialog (see the example below).

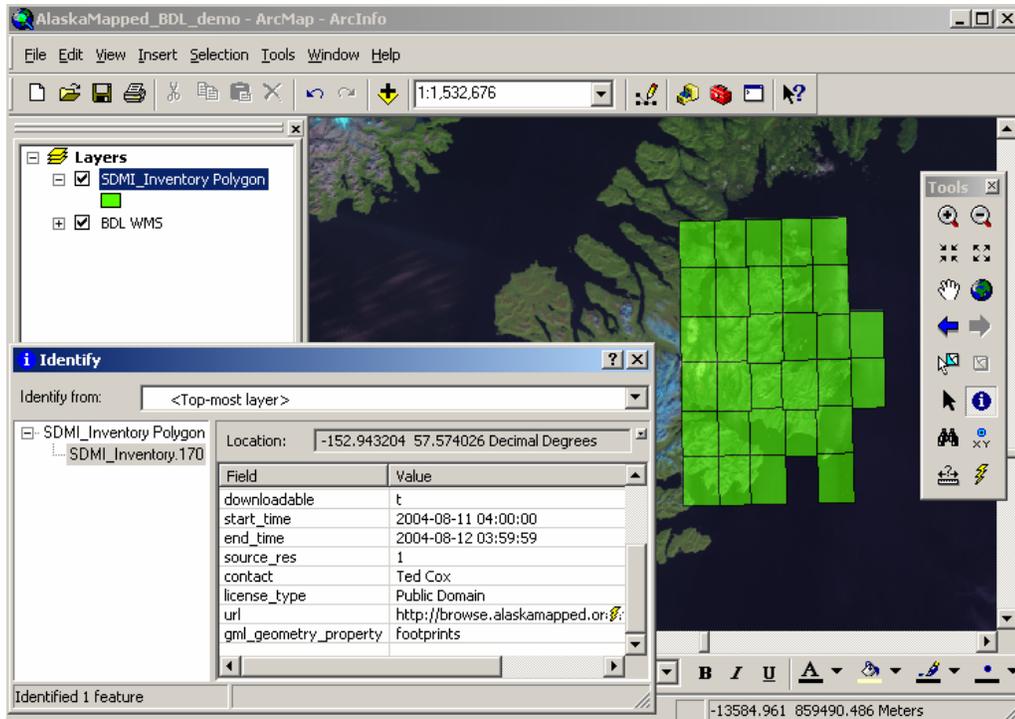


Click the OK button to apply these properties and dismiss the dialog.

32. Using the Zoom In tool, click and drag a box around the series of Inventory polygons on Kodiak Island (see the example on the right).

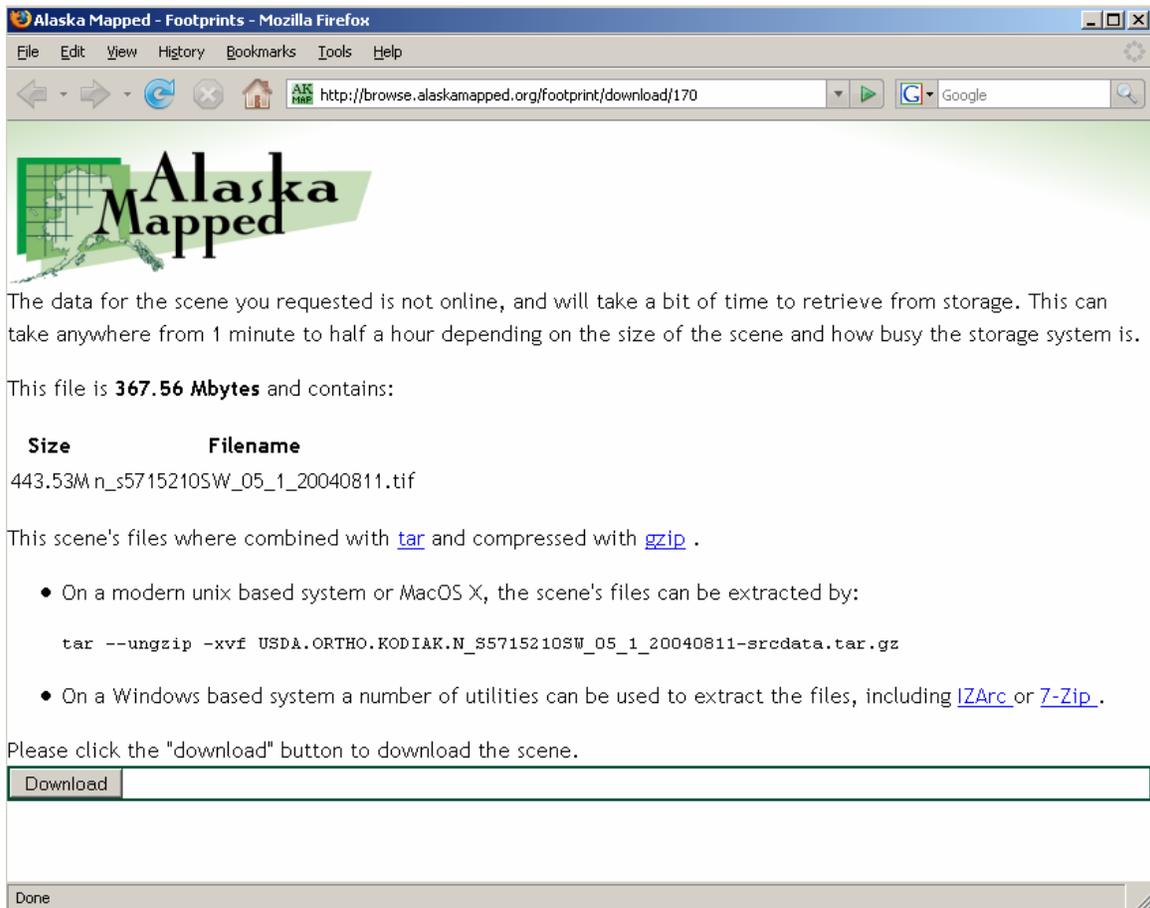


33. Using the Identify tool on the Tools toolbar, click on any of the Inventory polygons in the display area. In left hand side of the Identify window, all available image tiles beneath your mouse click are listed (only one in this example). If there had been more than one, selecting one of these records would flash the polygon related to the selected record on the map display.



Notice that a minimum set of metadata has been built into the Inventory WFS pertinent to the BDL WMS ortho image underlying the Inventory footprint polygon (i.e. contact, license_type, etc...). Pay special attention to the downloadable field. If the value for this field is the letter t, the original ortho imagery being referenced by that inventory polygon and displayed by the BDL WMS is freely downloadable from the browse.alaskamapped.org website.

34. If necessary, scroll down on the Identify window until the url field is visible. Notice the hyperlink lightning bolt icon to the right of the url value.
35. Click on the lightning bolt to launch the browse.alaskamapped.org download page specific to the ortho image represented by that Inventory polygon.



Clicking on the Download button on this webpage will execute a download of the original ortho image in the original format in which it was received by GINA prior to ingestion into the AlaskaMapped BDL WMS. You do not have to actually download the imagery for this tutorial, just keep in mind that this is how you can do it if you ever have the need to.

This concludes the AlaskaMapped Inventory WFS ArcGIS Tutorial.

You should now have an understanding of how to connect to the AlaskaMapped WMS and WFS using either ArcCatalog or ArcMap, and how to use the Inventory WFS to view metadata for imagery held within the BDL WMS as well as use the WFS Inventory polygons to hyperlink to the download page for the image to which they refer.

Thank you...
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Please email the GINA staff at wms@alaskamapped.org if you have further questions or comments.
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