HIS document 6

Adding an observation network to DASH (version 1.0)

A setup guide

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Distribution

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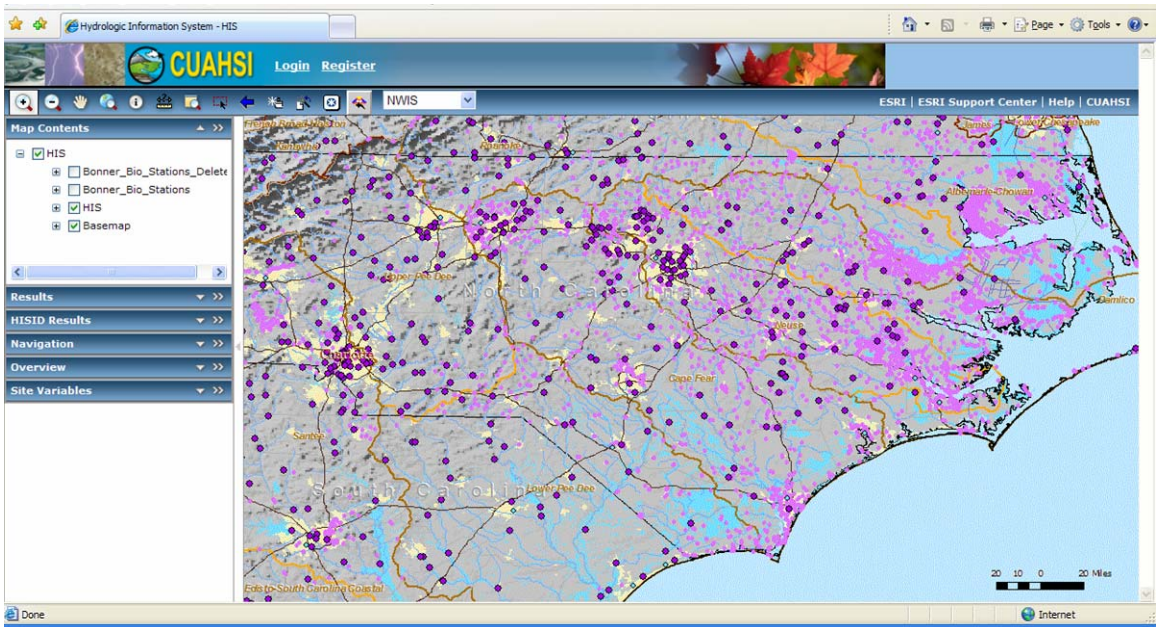
Table of Contents

Introduction

This is an exercise in adding a new network to the HIS server application DASH (Data Access System for Hydrological Sciences). DASH is a web application that comes pre-installed with HIS server machines (version 1.0). Its main function is to act as a one-stop portal for downloading environmental data from the many available data repositories on the internet (such as USGS and EPA). DASH is programmed in Visual Studio 2005 and its source code (or a pre-compiled version of the application) is shipped together with the HIS server machines. It is fully configurable by the user.



A network is defined as a collection of observation stations operated by a data source. For instance, the NWIS (National Water Information System) network is a collection of streamflow gages operated by the USGS (United States Geological Survey). In addition to downloading data from public networks, HIS server can download data from networks operated by independent researchers.

You will need to modify DASH by adding a network to the application. The network is your data which would have been previously loaded into an ODM database structure using the ODDataLoader and had a WaterOneFlow web service configured to use it.

Computer and Skill Requirements

This assumes that you have a fully configured HIS server machine and that the HIS server application (DASH) is installed and running properly. As such the following software would already be on your machine

1. Windows Server 2003 R2 Standard Edition (32-bit) or Windows XP Pro
2. Internet Information Service (IIS)
3. SQL Server 2005 or SQL Express
4. ArcGIS Server 9.2

5. ArcSDE 9.2
6. ArcGIS Desktop 9.2
7. Net 2.0 Framework (and optionally, Visual Studio .Net 2005)
8. HIS server application (DASH)

In addition to the above, these procedures require the following items:

1. Internet connection
2. Microsoft Internet Explorer (version 6.0 or higher) or Mozilla Firefox (1.0 or higher)
3. XMLViewEdit.exe
    - This is an xml editor which is available through Arc Hydro tools. You can download this tool from http://support.esri.com/index.cfm?fa=downloads.dataModels.filteredGateway&dmid=15. Please see Appendix I for information about installing Arc Hydro tools.

Note: If you do not wish to install XMLViewEdit via the Arc Hydro tools, there are plenty of other XML editors out there on the web for download.

You will also need to have some familiarity with the following software environments:

1. SQL Server 2005 Standard Edition
2. ArcGIS Desktop

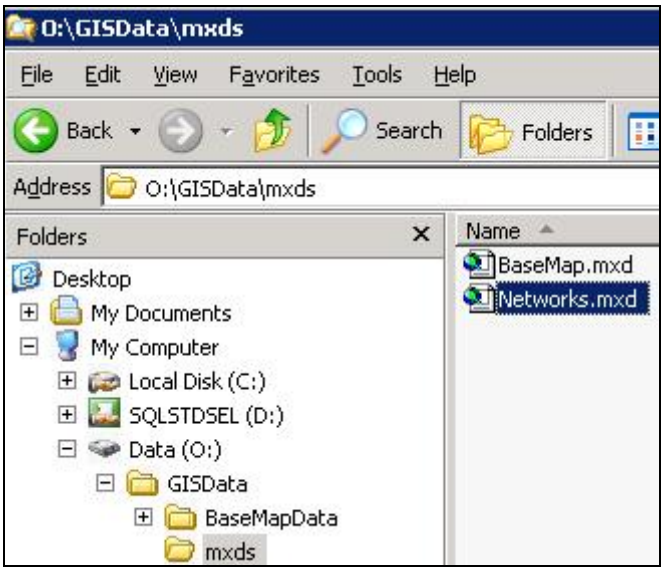
Step 1: Create shapefile from sites table.

In order to show your LBRTest sites on this map interface, a shapefile of the site locations needs to be created and added to the underlying ArcMap document which is being read by DASH.

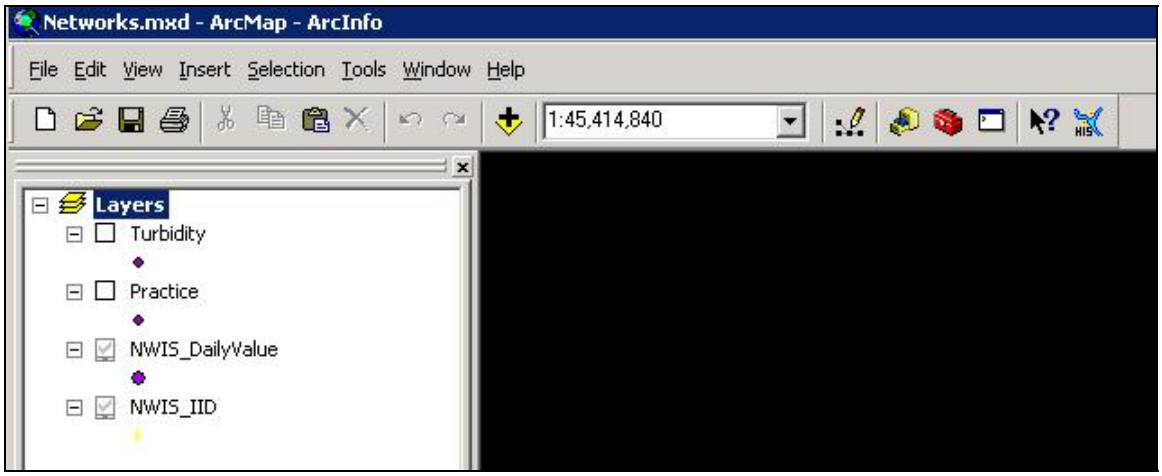
Note: A shapefile is just a type of Geographic Information System (GIS) file storing spatial data. If you don't know what a shapefile is, that's ok, because CUAHSI tools take care of creating the shapefile for you.

1. Open the Networks.mxd map document located here:

O:\GISData\mxds\Networks.mxd



The file opens with ArcMap, which is the map viewing GIS software from ESRI. You see a strange looking map like the one below. Don't worry about the lack of basemap data in the map. The DASH application reads basemap data from another source. The only thing the Networks.mxd file is used for is providing the site locations.



The window on the left of the ArcMap application is called the Table of Contents. It lists the data layers that are visible in the map. You should at least see layers for NWIS data in your map. If your HIS Server has been installed with additional data layers, like UT's HIS Server has, then you will also see those data layers in the Table of Contents.

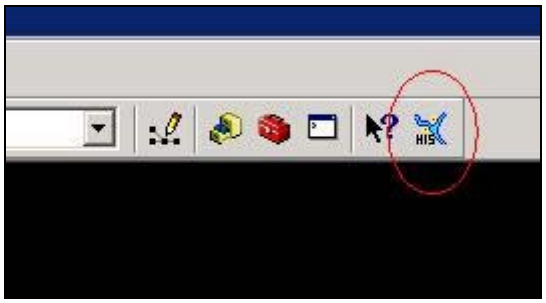
If a data layer does not have a check mark next to it, then it is turned off. As long as a layer is turned off, it will not show up in the map.

If a data layer has a grey check mark next to it, then this layer is drawn with scale-dependent rendering. This means that if the map is zoomed way out, the layer will not show up, most likely because the database administrator decided that there were too many points to try to fit on the map at that scale. When the map is zoomed in so that not

so many points show up in the map display, then the layer becomes visible. Scale-dependent is useful for datasets such as NWIS, where tens of thousands of points may be visible in the map if zoomed out far enough.

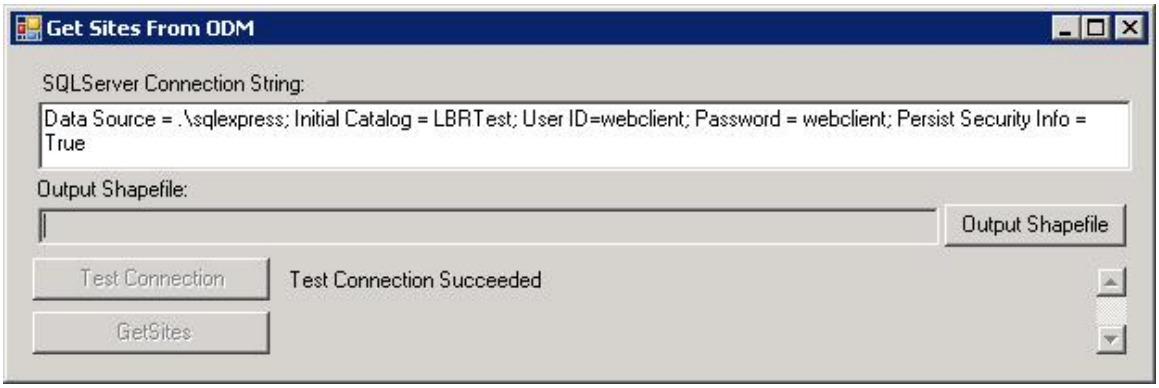
Each of the data layers in the map is reading from a shapefile stored on HIS Server, which provides the location for each point in the layer. You will use a custom tool created by CUAHSI in order to create a shapefile for your sites in the ODM database, and add that shapefile as a layer to the map.

2. Click the Get Sites button in ArcMap.

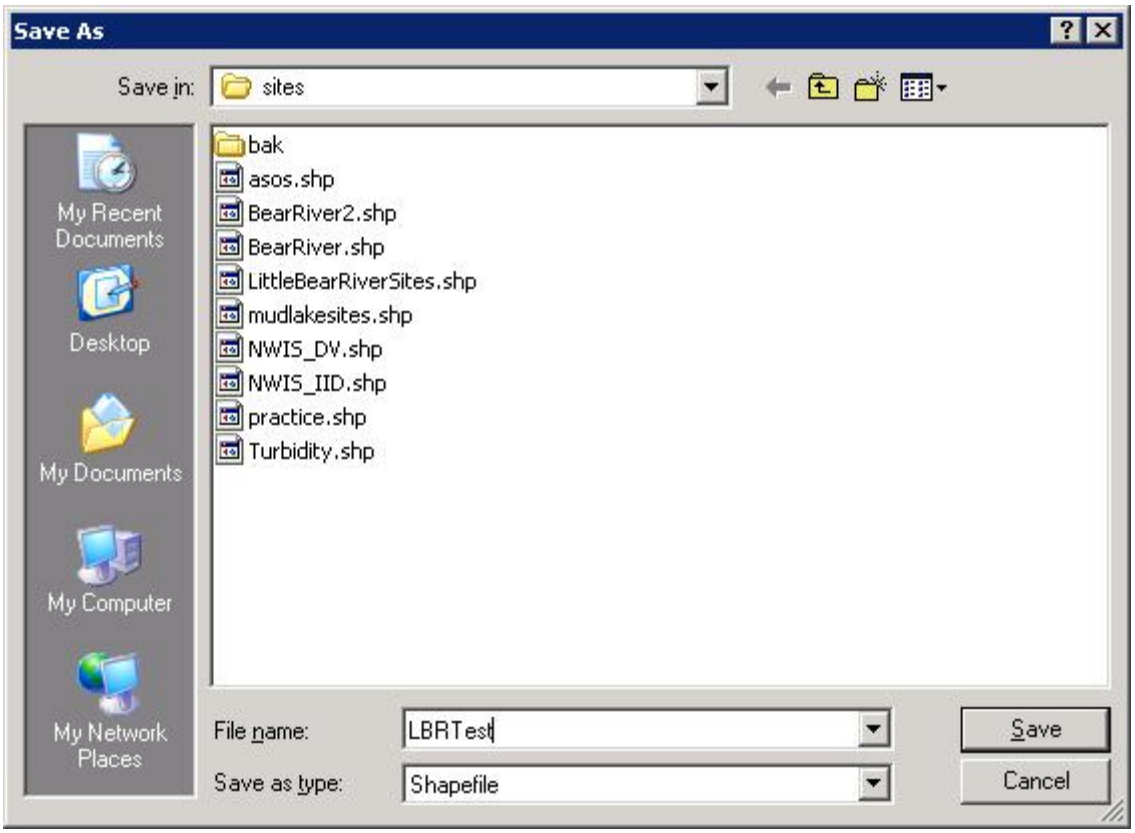


This tool reads locations from an ODM database, creates a shapefile from those locations, and adds the shapefile to the map as a new layer.

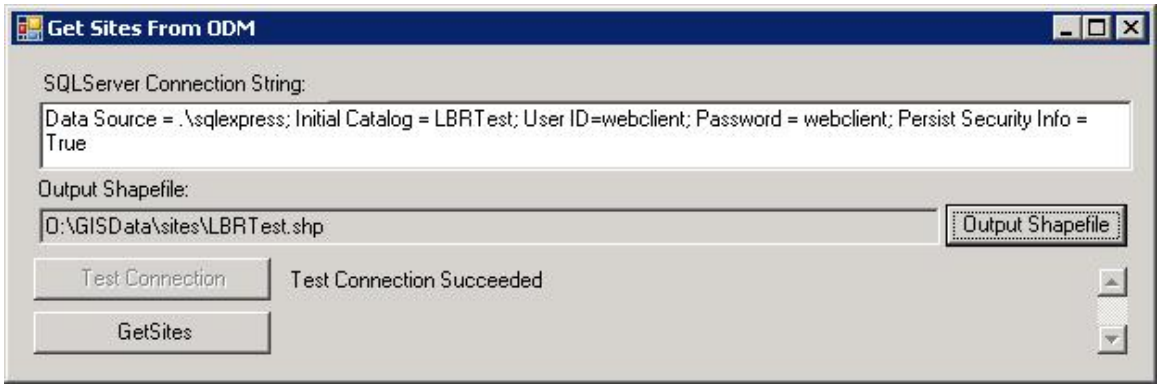
3. In the Get Sites From ODM dialog, input the database connection string to your ODM database, and then click Test Connection to ensure that the string was entered correctly. This is the same connection string that you used when configuring your ODM web service to read from your ODM database.



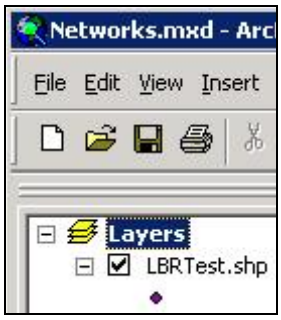
4. Click the Output Shapefile button. Navigate to O:\GISData\sites\, and save the shapefile. For the screenshots in this example, the shapefile is saved as LBRTest.shp. You'll notice other shapefiles of site locations in this same folder.



The completed Get Sites From ODM dialog should look similar to the one below.



5. Click the GetSites button. In a moment, a new layer is added to the map. You may need to move the dialog out of the way to see the new layer in the Table of Contents.

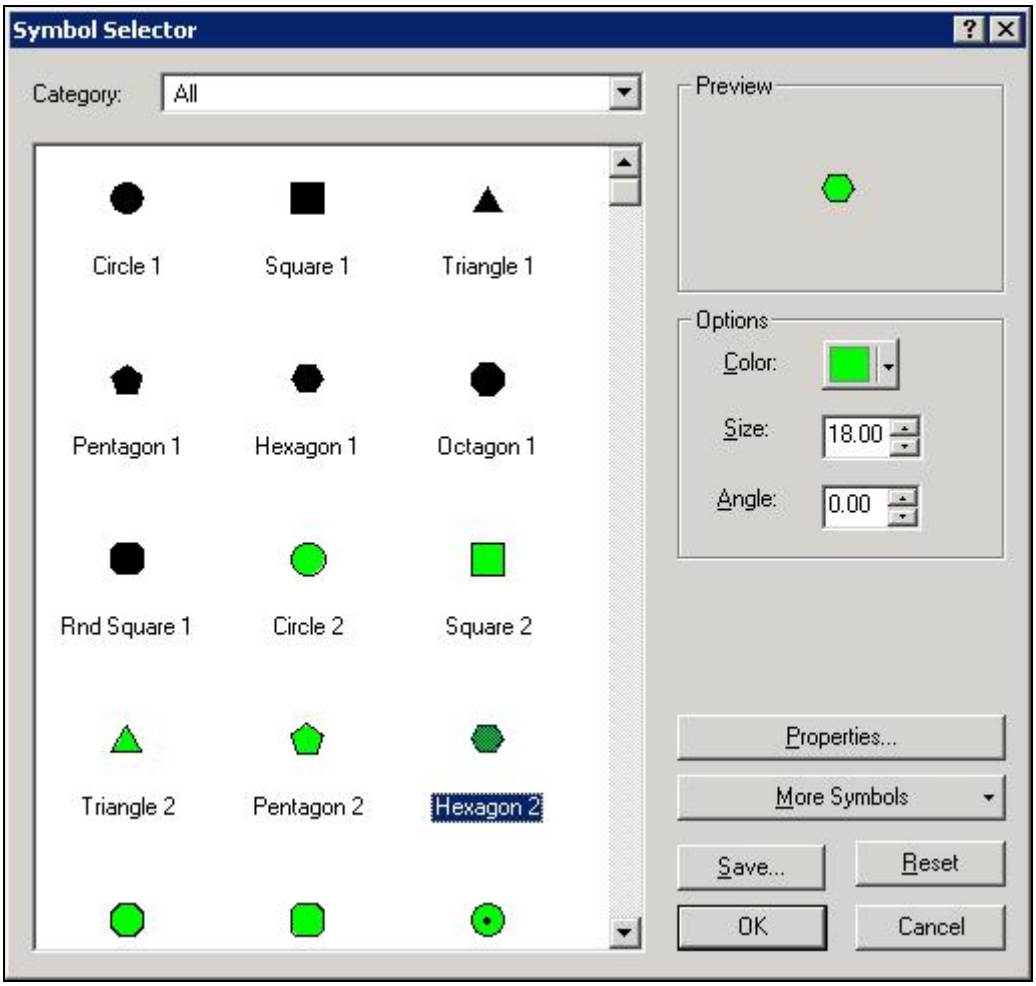


The layer has the name of the shapefile by default. Let's give it a more descriptive name, so that users who browse the DASH application will have a better idea of what they're looking at.

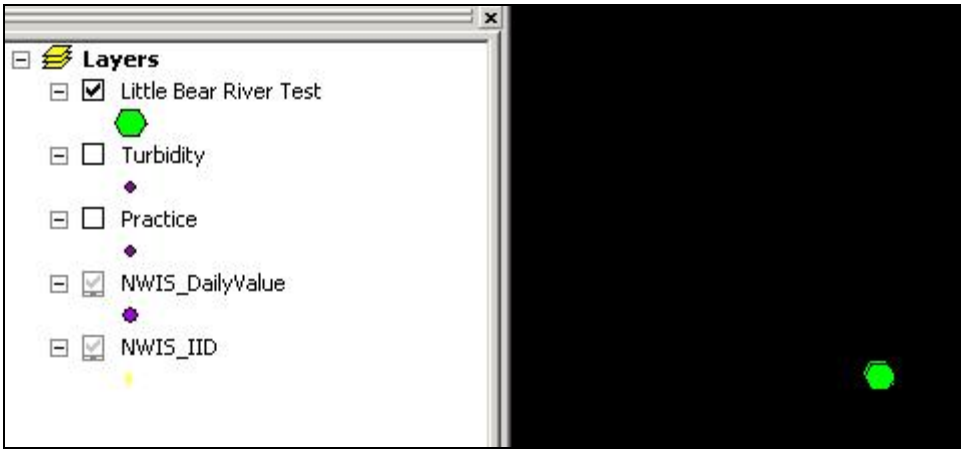
6. Left click on the new layer in the Table of Contents to select it, and then press F2 on your keyboard. This allows you to rename the layer.
7. Change the name to something for descriptive, and press Enter. For this example, the name Little Bear River Test is used.

Now let's change the symbol for the points in this layer, so that we can more easily distinguish these points from other points in the map.

8. Left click on the symbol for the new layer (the little dot under the layer's name).
9. In the Symbol Selector window, click on a large symbol, such as the green hexagon, and click OK.



You'll see the symbol updated in the Table of Contents, as well as in the map.



At this point you could also define scale-dependent rendering for this layer. Since there are only two points in this dataset, let's not worry about it. If you'd like to learn more about scale-dependent rendering, and other fancy ways of displaying your layer with ArcMap, consult your ArcMap Desktop Help.

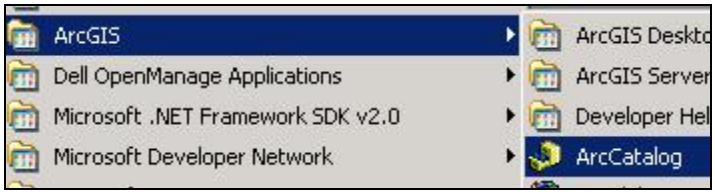
10. Save the map document (File --- Save), and close ArcMap.

Step 2: Refresh the Networks MapService

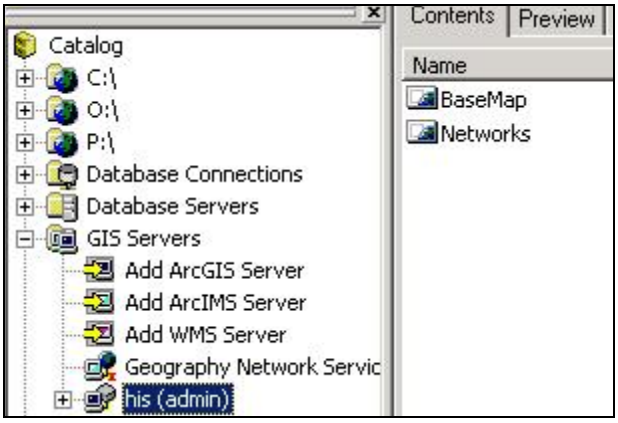
Since you have made changes to the map document underneath DASH, you must now refresh the map service for DASH. We do this by stopping and starting the service. This tells the ArcGIS Server to incorporate what we've changed about DASH into what is exposed to the web.

The service can be restarted using ArcCatalog.

1. Start ArcCatalog. (Start --- All Programs --- ArcGIS --- ArcCatalog)

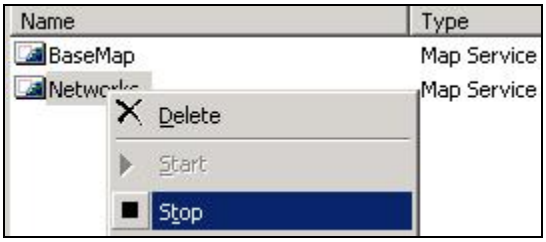


2. In ArcCatalog, expand the node for GIS Servers, and find the name of your machine (e.g., HIS). Double click this item to see the services for this item.



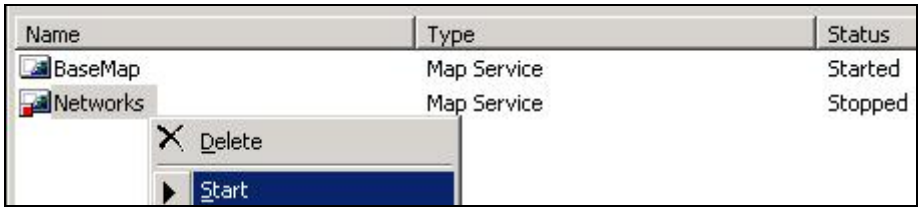
You should see a BaseMap and a Networks service. You'll refresh the Networks service by stopping and starting it back up again.

3. Right click on the Networks service and click Stop.



When the service has stopped, the Status field should indicate as such, to the right of the service Name and Type.

4. Right click on the Networks service and click Start.



5. When the Status for Networks changes from Stopped to Started, close ArcCatalog.

Step 3: Configure the HISNetworks.xml file

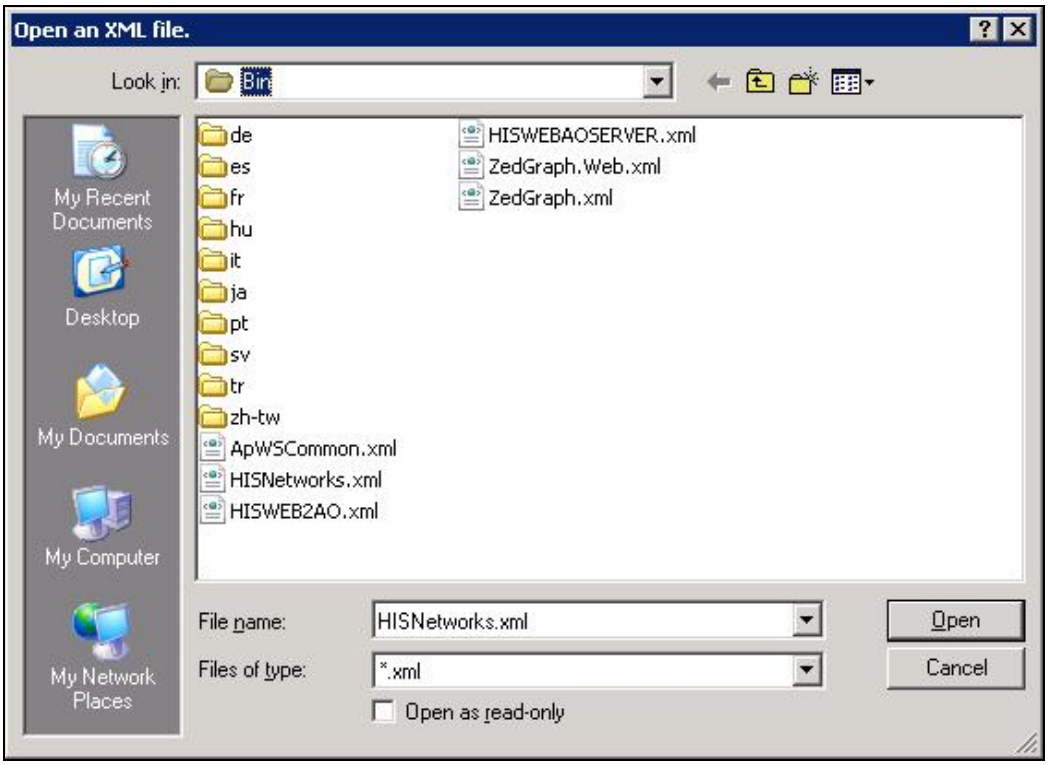
With the map updated, the next step is to configure the DASH application, in order to make the new points on the map interactive. In order to do this, DASH needs to know where the database is, which the points are representing, as well as the location of the web service that runs on top of the database.

Configuration of the DASH application to add a new network is controlled by the HISNetworks.xml file. HISnetworks.xml file is located in the directory of [DASH installation place]/bin. **No code modification is needed**.

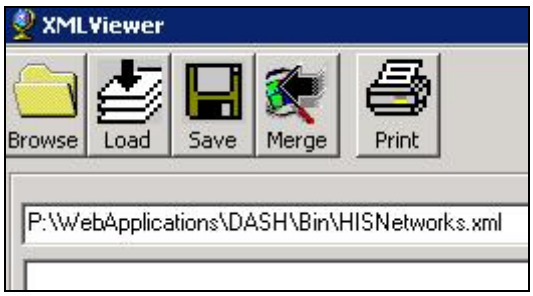
HIS Server comes equipped with an XML editor called XMLViewEdit that you can use to update this configuration file. A shortcut to this application has been saved on your HIS Server's desktop.

1. On the desktop of HIS Server, double click the XMLViewEdit icon to run the application.

2. In XMLViewEdit, click the Browse button. Browse to P:\WebApplications\DASH\Bin\, and open the HISNetworks.xml file.



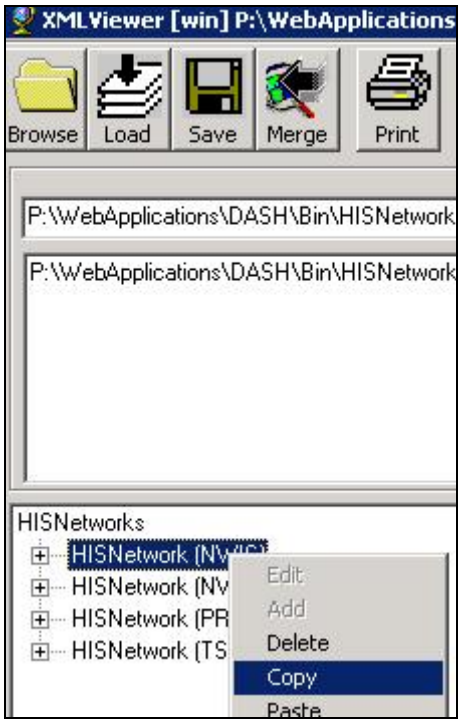
The filename shows up in XMLViewEdit, but you still need to tell the program to read through (load) the XML.



3. Click Load. The XML elements appear at the bottom of the window.

There is an HISNetworks element, with a child element for each observations network published by DASH. You will need to add a child element for the LBRTest network, which is the sample network used in these screenshots. The easiest way to do this is to copy an existing element, and then change some of its properties to reflect the LBRTest data.

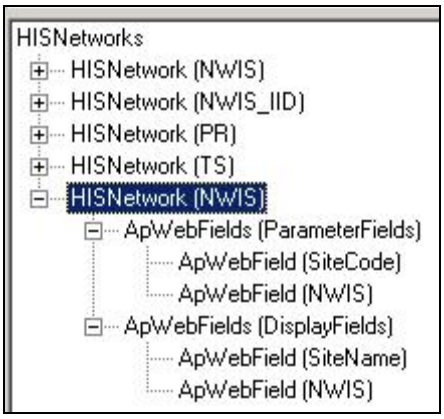
4. Right click on the HISNetwork (NWIS) element, and click Copy.



You want to paste a copy of this element at the same level in the XML document as the other network elements. To do this, you will paste into the HISNetworks root node of the XML document.

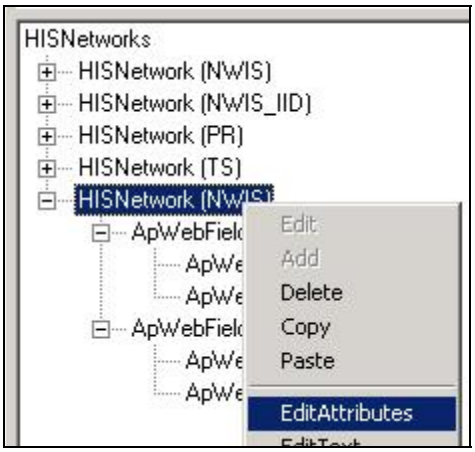
5. Right click on HISNetworks, and click Paste.

6. A new element now appears in the tree. Expanding its sub elements. You can see that it is still keyed towards the NWIS network.

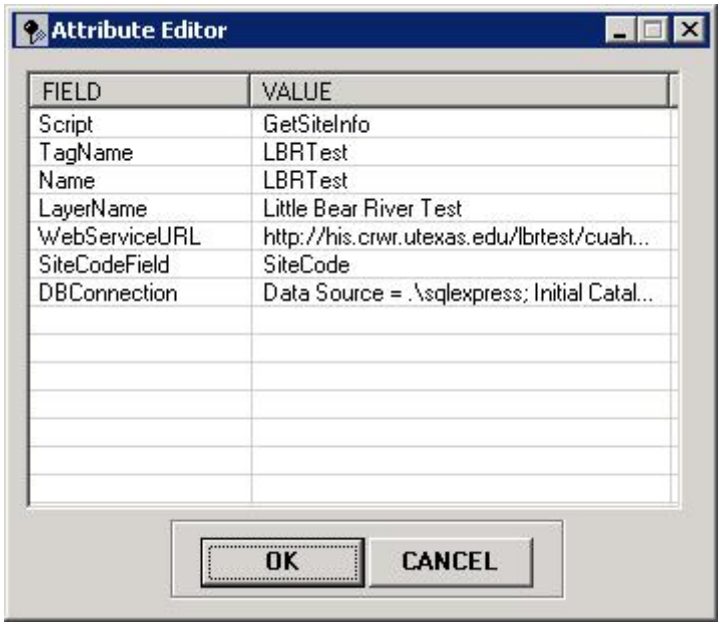


Basically, what you'll do now is modify the attributes of any of our new elements that say "NWIS", beginning with the HISNetwork element itself.

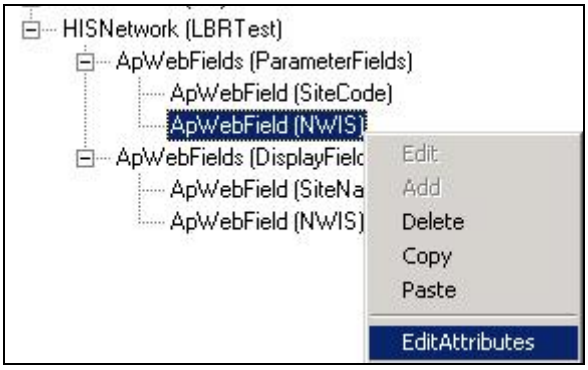
7. Right click on the new HISNetwork (NWIS) element, and click Edit Attributes.



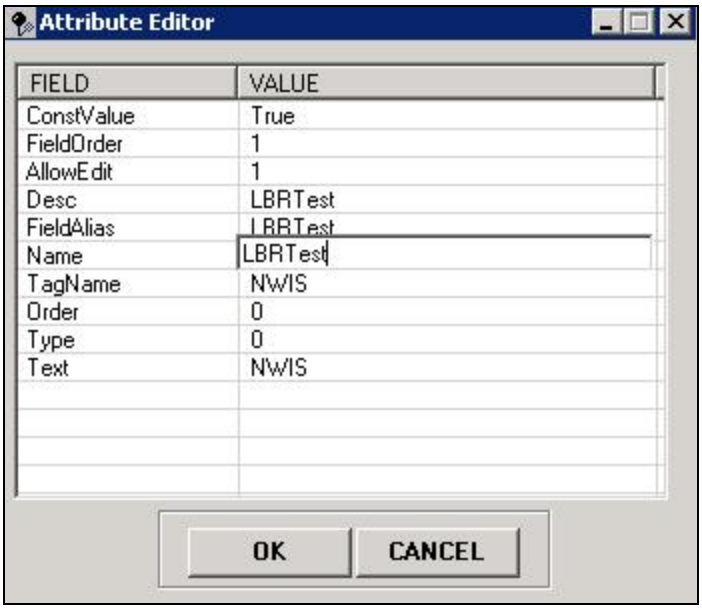
8. You can edit attributes by double clicking on the value of a given attribute. Edit the following attributes, giving them the new values listed below:
    a. TagName - LBRTest
    b. Name – LBRTest
    c. LayerName – Little Bear River Test [this should match the layer name that you assigned in the Table of Contents in ArcMap]
    d. WebServiceURL – *The URL to the WSDL for your ODM web service*
    e. DBConnection – *The connection string to your database* (this is the same string you used in ArcMap when creating the sites shapefile a moment ago)



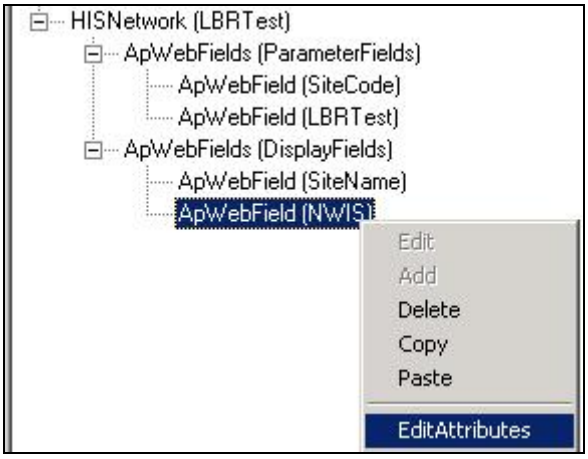
9. Click OK to confirm the attribute edits.
10. Now edit the attributes for the ApWebField element under ApWebField (ParameterFields).



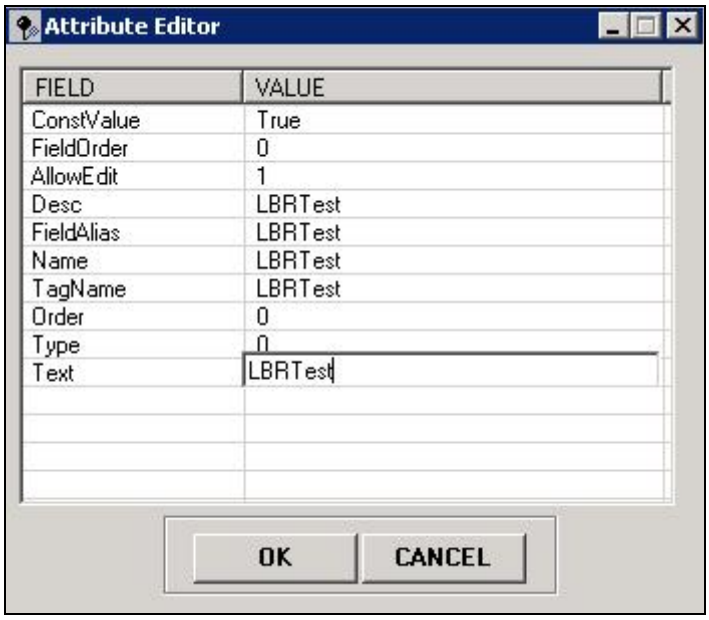
11. This one's easy. Just change anything that says "NWIS" to "LBRTest", and click OK.



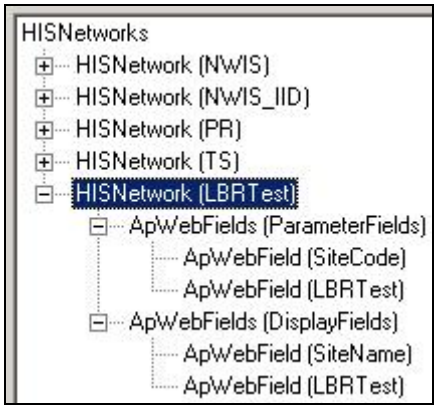
12. Now edit the attributes for the ApWebField element under ApWebField (DisplayFields).



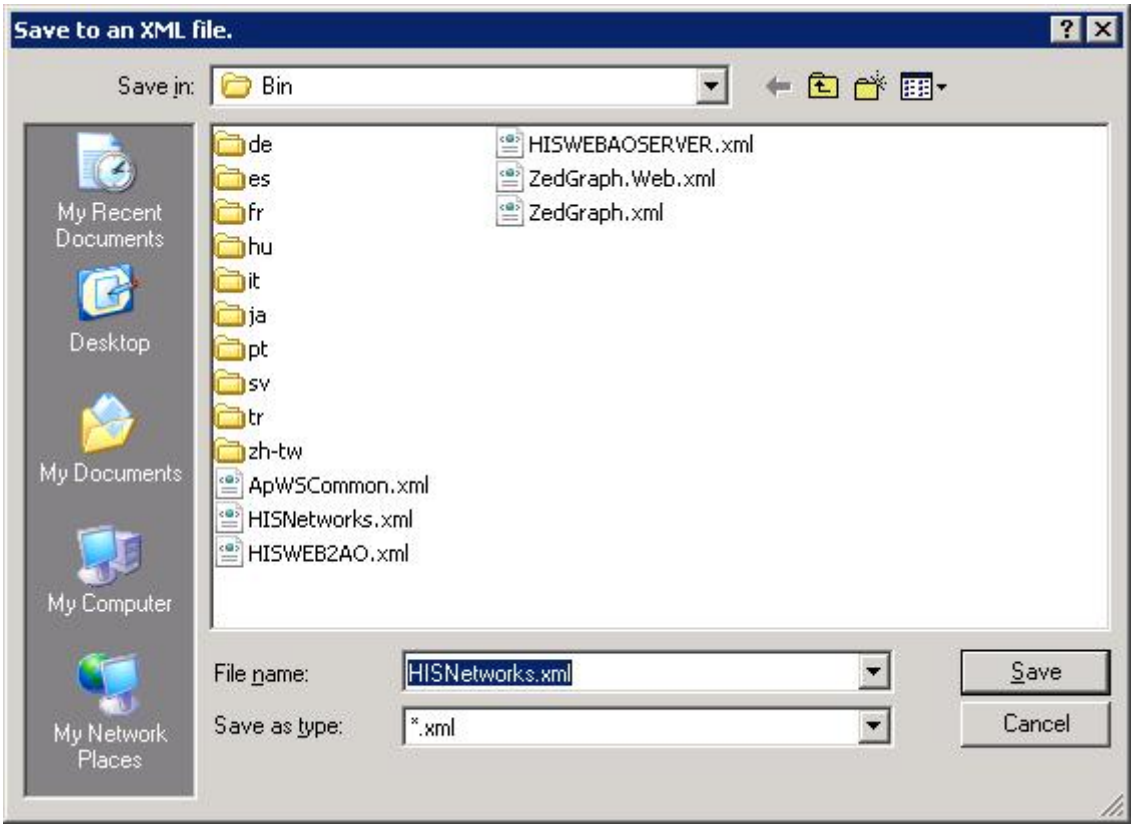
13. As before, change anything that says “NWIS” to “LBRTest”, and click OK.



Now in the XMLViewEdit main window, the items that said “NWIS” in our new element should now say “LBRTest”.



14. Click the Save button.
15. Overwrite the existing HISNetworks.xml file.



16. Click Yes when prompted to overwrite.

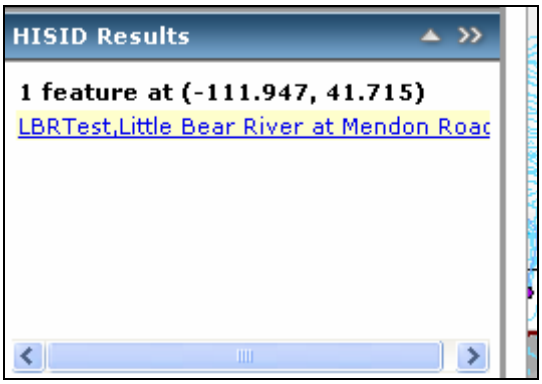
That's it! The configuration changes have been saved.

Step 4: Check the new network

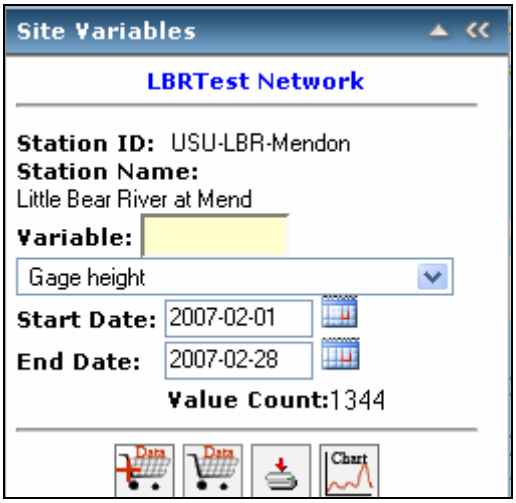
You'll now open up DASH for a quick test to see if your network was added.

1. Open up internet explorer and browse to the webpage of DASH. (http://yourServerName/DASH)
2. In the network dropdown menu, select **your Network**.

3. Click on the HISIdentify tool  and then click on one of the monitoring sites in the newly added layer. Within the HISID Results panel on the left hand side of the screen, select any one of the sites identified by the tool by clicking on it.



This should bring up the Site Variables form. This is a form that lists what variables are measured at the selected station, the extent of the sampling period, and the number of data points collected. The values in this form are all populated from information stored within your ODM database.



4. Click on the **Get CSV** button  . In the next pop-up window, click on **Download**. This will bring up a dialog asking where you will save a zip file. This zip file contains a comma delimited file that has the time series of data that you requested.
5. Save the zip file to a location of your choice and then open up the text file contained within it. You should see a comma delimited list of datetimes and values for the selected time series.

Congratulations! You have successfully added an observations network to DASH.

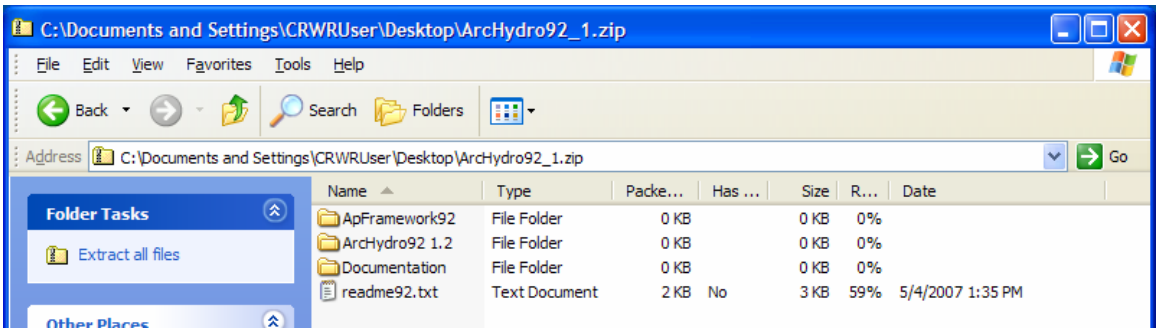
Appendix I

Instructions for installing XMLViewEdit.exe

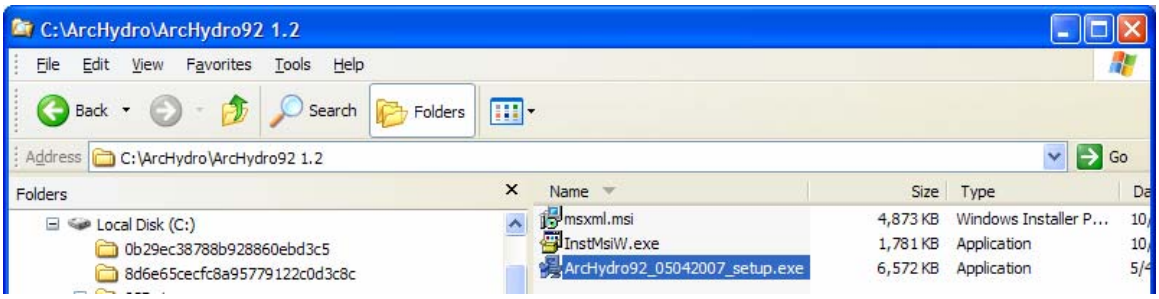
It is recommended that you use XMLViewEdit.exe to modify the XML files present in the HIS server software. XMLViewer tool is packaged within ArcHydro tools and is available from the ESRI website at: http://support.esri.com/index.cfm?fa=downloads.dataModels.filteredGateway&dmid=15.

Scroll down the web page and click on the link below:
(Latest version as of 06/26/2007 is Arc Hydro Tools version 1.2 Final for ArcGIS 9.2
.pdf, .exe, .msi, and .txt - zip format, 18271kb (submitted 05/04/2007 - updated 05/16/2007))

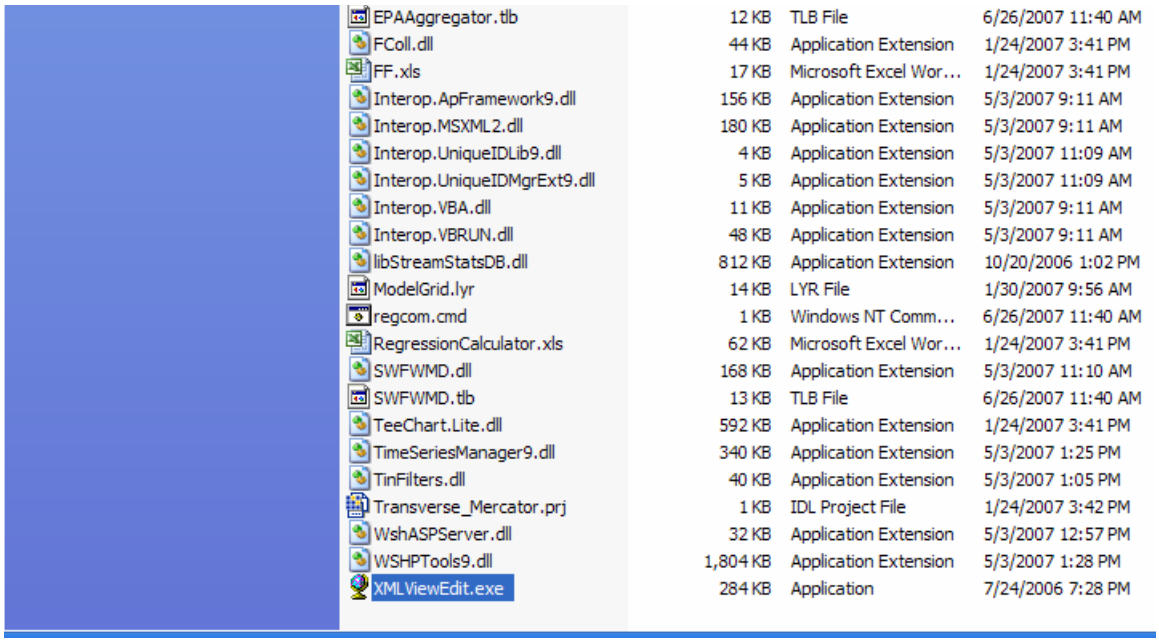
Then unzip the contents of the zip file to a local directory, e.g. C:\ArcHydro.



Navigate to the ArcHydro92 1.2 subfolder and run the ArcHydro92_05042007_setup.exe file.



If you choose to install to the default directory, XMLViewEdit.exe will be installed to the folder, C:\Program Files\ESRI\WaterUtils\ArcHydro9\Bin\. Navigate to the folder and then click on XMLViewEdit.exe to run it.

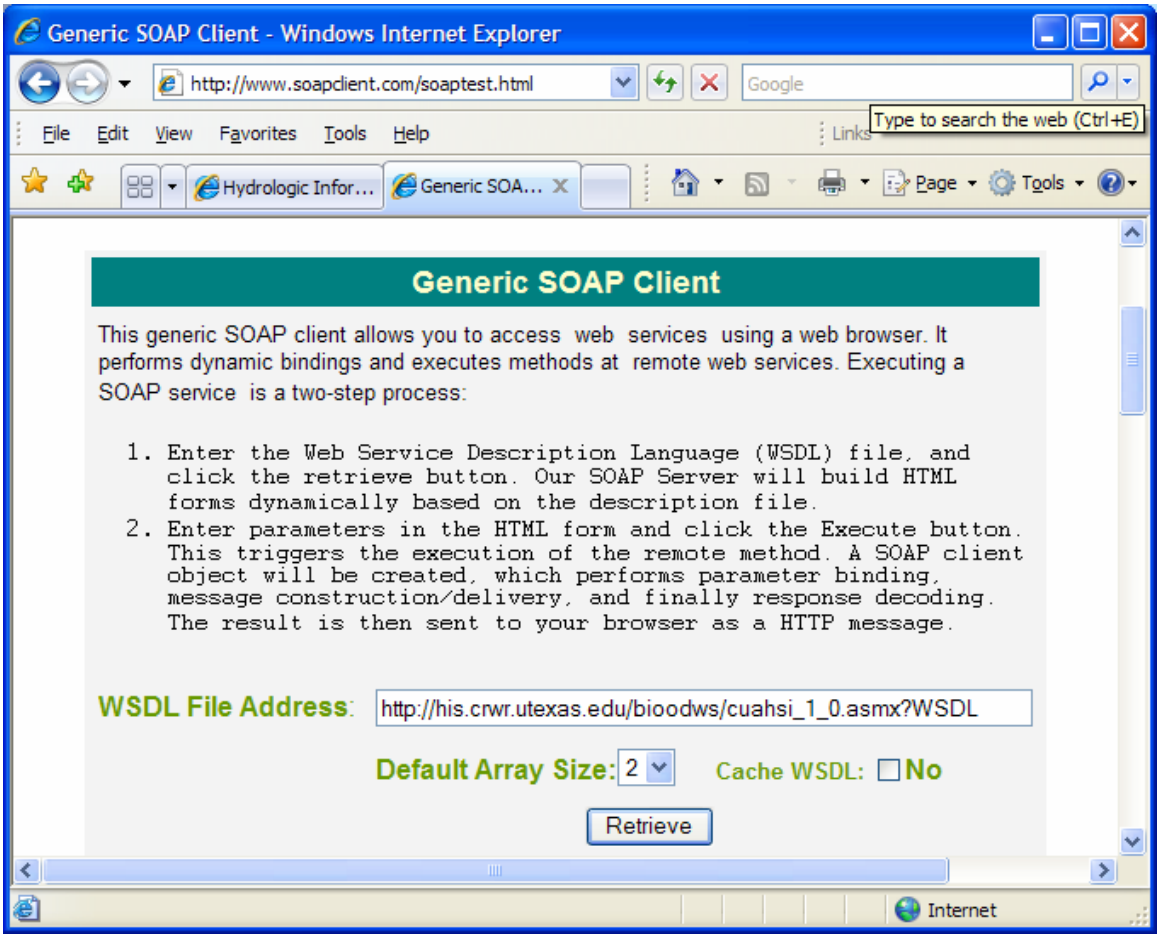


EPAAggregator.tlb	12 KB	TLB File	6/26/2007 11:40 AM
FColl.dll	44 KB	Application Extension	1/24/2007 3:41 PM
FF.xls	17 KB	Microsoft Excel Wor...	1/24/2007 3:41 PM
Interop.ApFramework9.dll	156 KB	Application Extension	5/3/2007 9:11 AM
Interop.MSXML2.dll	180 KB	Application Extension	5/3/2007 9:11 AM
Interop.UniqueIDLib9.dll	4 KB	Application Extension	5/3/2007 11:09 AM
Interop.UniqueIDMgrExt9.dll	5 KB	Application Extension	5/3/2007 11:09 AM
Interop.VBA.dll	11 KB	Application Extension	5/3/2007 9:11 AM
Interop.VBRUN.dll	48 KB	Application Extension	5/3/2007 9:11 AM
libStreamStatsDB.dll	812 KB	Application Extension	10/20/2006 1:02 PM
ModelGrid.lyr	14 KB	LYR File	1/30/2007 9:56 AM
regcom.cmd	1 KB	Windows NT Comm...	6/26/2007 11:40 AM
RegressionCalculator.xls	62 KB	Microsoft Excel Wor...	1/24/2007 3:41 PM
SWFWMD.dll	168 KB	Application Extension	5/3/2007 11:10 AM
SWFWMD.tlb	13 KB	TLB File	6/26/2007 11:40 AM
TeeChart.Lite.dll	592 KB	Application Extension	1/24/2007 3:41 PM
TimeSeriesManager9.dll	340 KB	Application Extension	5/3/2007 1:25 PM
TinFilters.dll	40 KB	Application Extension	5/3/2007 1:05 PM
Transverse_Mercator.prj	1 KB	IDL Project File	1/24/2007 3:42 PM
WshASPServer.dll	32 KB	Application Extension	5/3/2007 12:57 PM
WSHPTools9.dll	1,804 KB	Application Extension	5/3/2007 1:28 PM
XMLViewEdit.exe	284 KB	Application	7/24/2006 7:28 PM

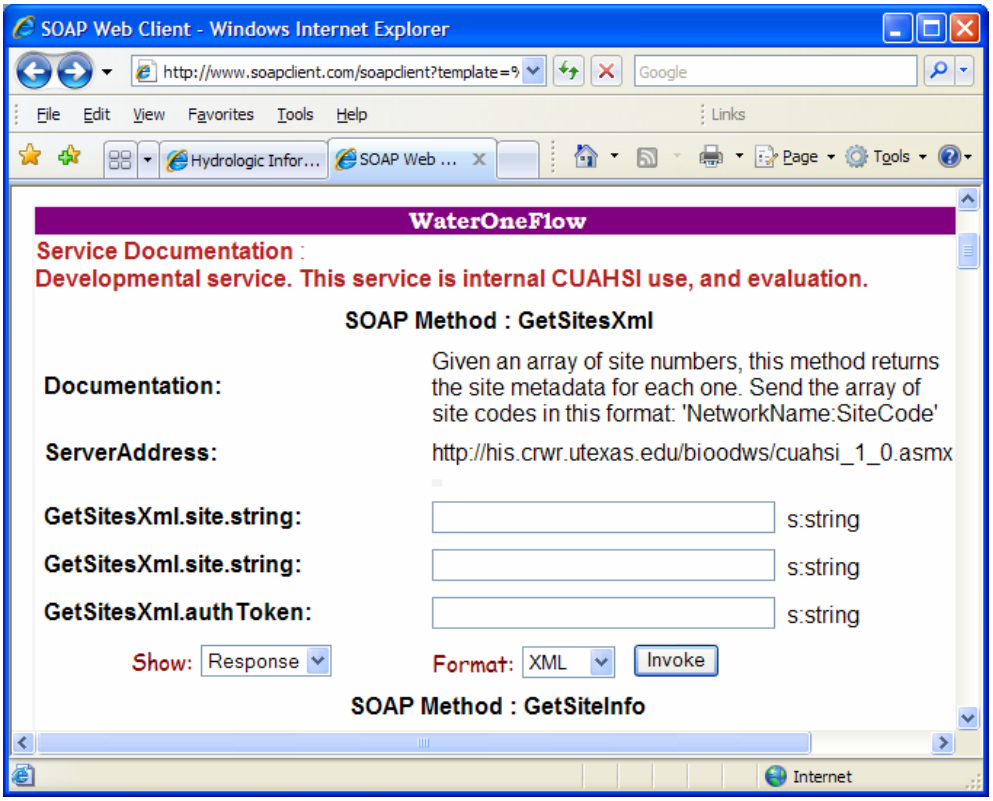
Appendix II

Testing a web service

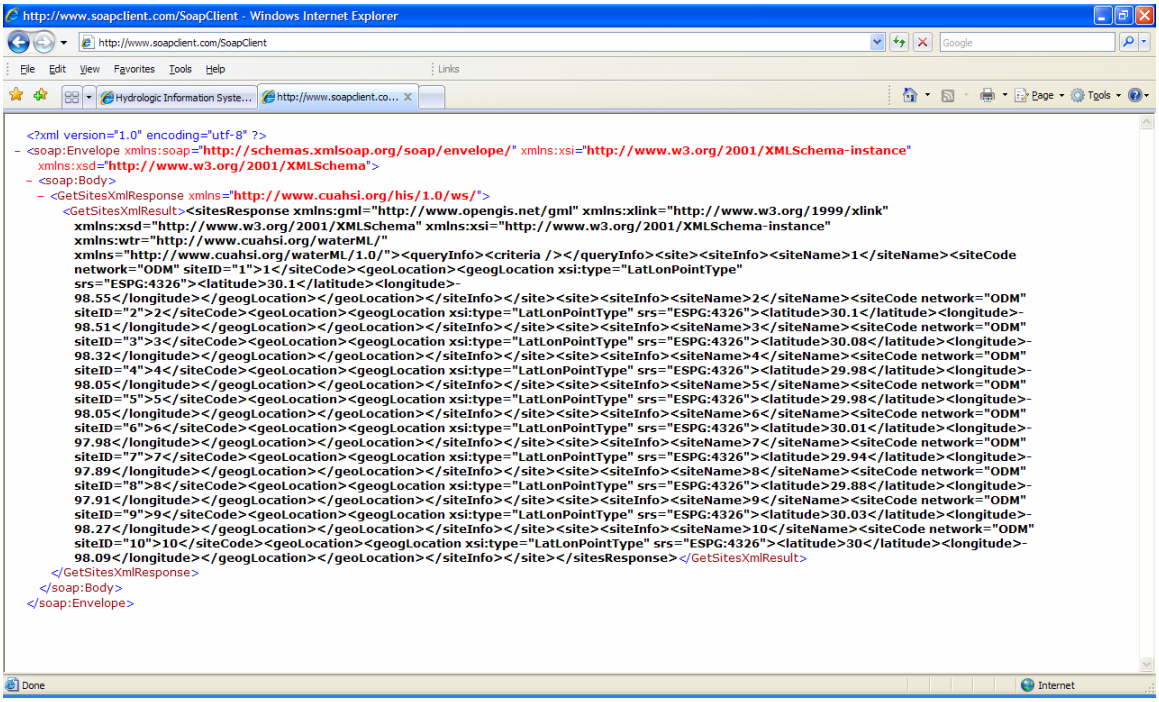
You can use a generic soap client available at http://www.soapclient.com/soaptest.html to test web services. To do this, open up a web browser and enter the above URL into the address bar.



In the WSDL File address slot, enter the web service WSDL, e.g. http://his.crwr.utexas.edu/bioodws/cuahsi_1_0.asmx?WSDL, and hit the **Retrieve** button. This will bring up the following interface:



Under the **SOAP Method: GetSitesXml**, leave the input slots blank and hit the **Invoke** button. This will call the web service to return all the information about the stations in Dr. Bonner's network in xml format. If the web service works, it will show the following screen:

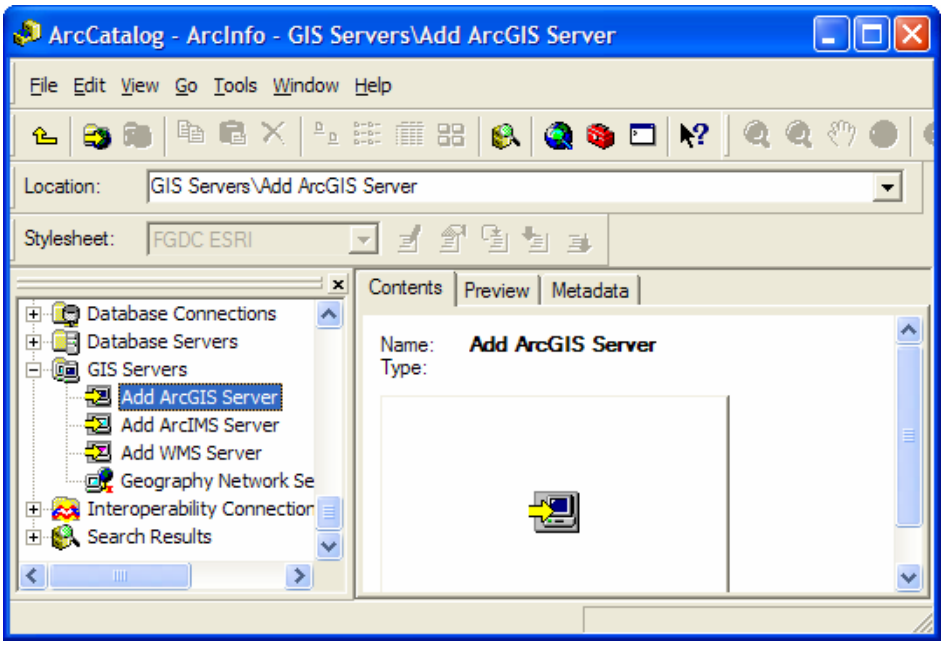


This concludes the test.

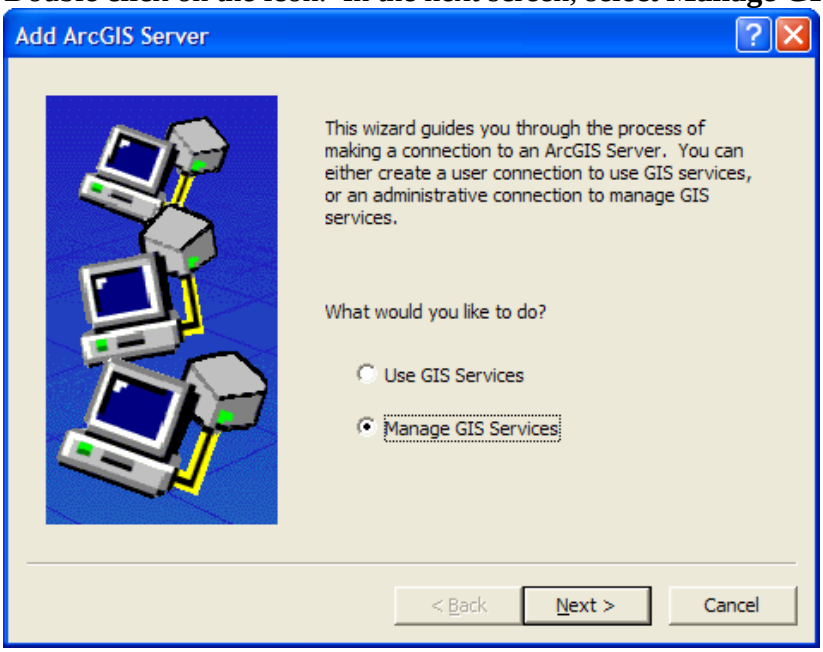
Appendix III

Adding a GIS Server to ArcCatalog

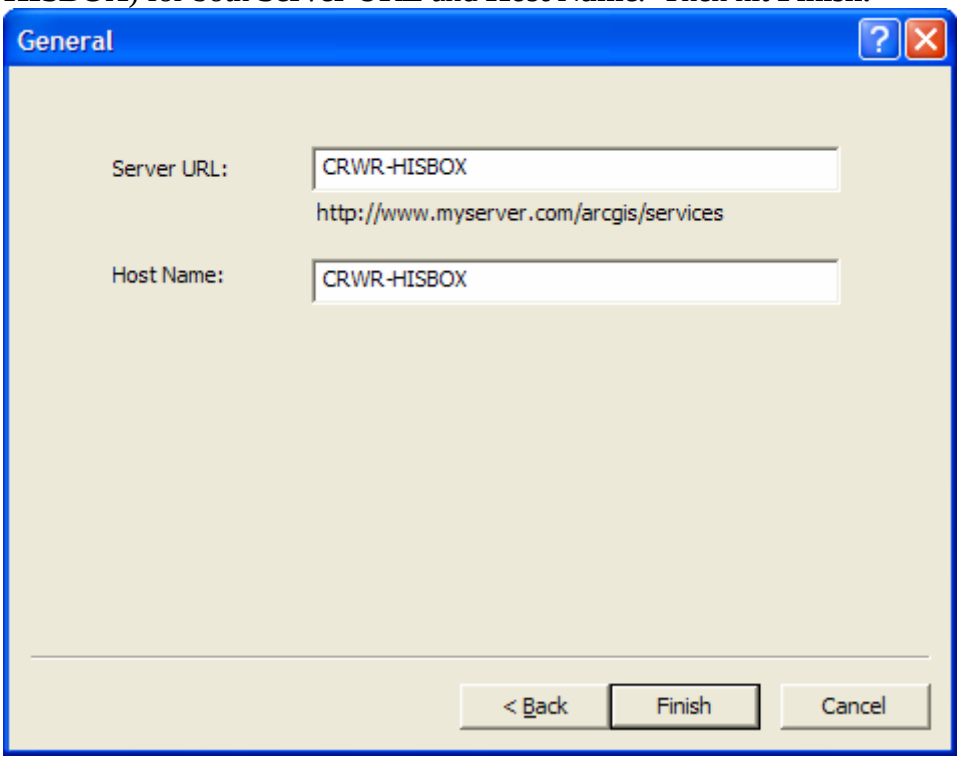
Open ArcCatalog and navigate to **GIS Servers.** Expand **GIS Servers** and select **Add ArcGIS Server** as shown.



Double click on the icon. In the next screen, select **Manage GIS Services** and hit **Next**.



In the next screen, type in the name of your HIS server (in my case it is **CRWR-HISBOX**) for both **Server URL** and **Host Name**. Then hit **Finish.**



You have added a GIS server to your machine.