

Australian Hydrological Geospatial Fabric (Geofabric) Tutorial

Calculate rainfall summary statistics
for a derived catchment

Version 2.1 – November 2012



Australian Government
Bureau of Meteorology



Australian Hydrological Geospatial Fabric (Geofabric) Tutorial – Calculate rainfall summary statistics for a derived catchment

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1 Introduction

External data can be incorporated with Geofabric data for hydrological analysis.

This tutorial steps through the process of creating a derived catchment using Geofabric Surface Network and adding rainfall data from the Bureau's website.

This tutorial was part of the Geofabric webinar "Making the most of the Geofabric" and is available at:

<http://www.bom.gov.au/water/newEvents/presentations/index.shtml>

1.1 ArcGIS version

The steps outlined in this tutorial use ArcGIS 10 (SP 3).

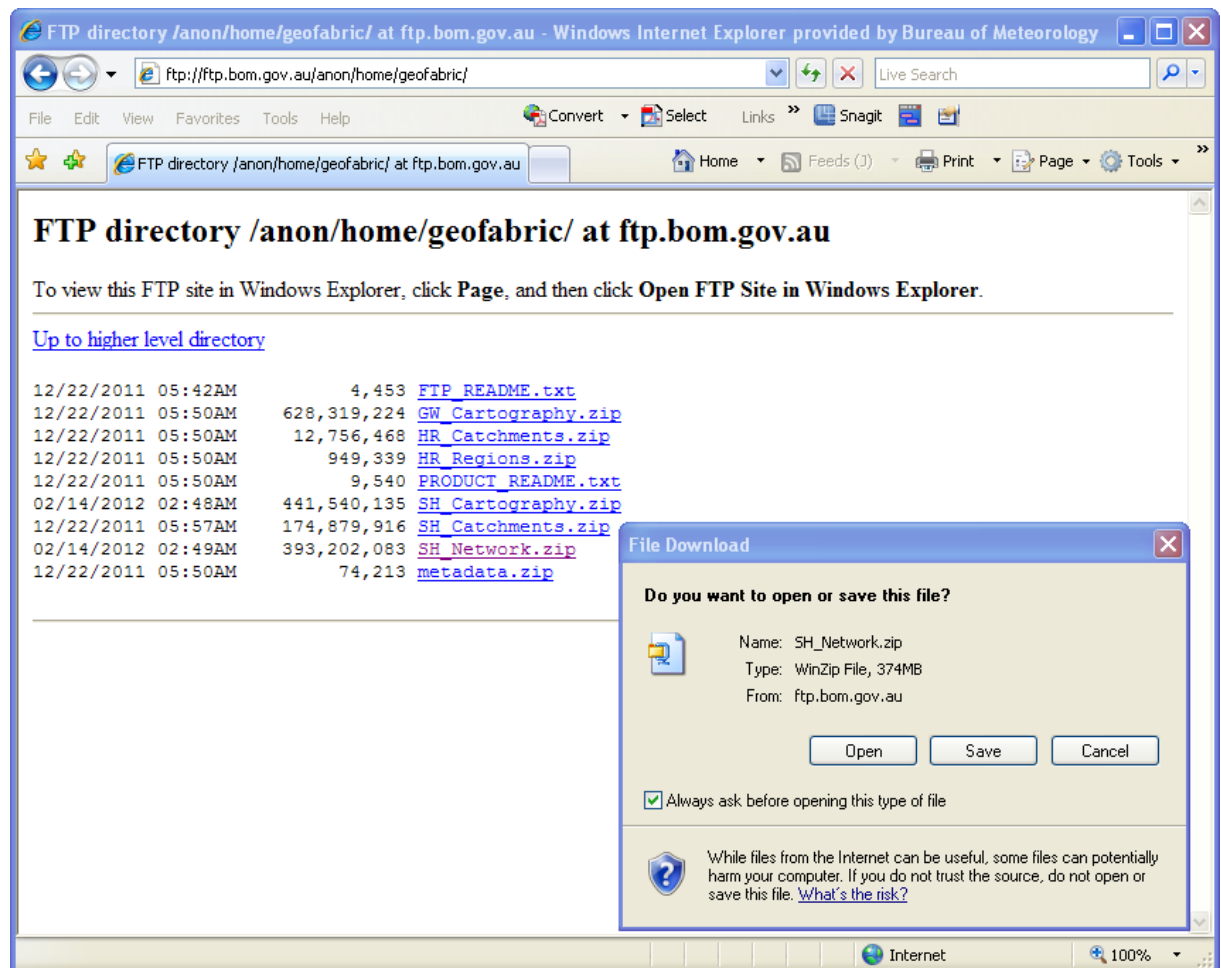
1.2 Symbolology

The symbolology used in this tutorial is based on the Surface Network LYR file.

2 Tutorial

2.1 Download the Surface Network File Geodatabase

1. From the [Bureau of Meteorology Geofabric](#) website browse to Downloads and select [Download the Geofabric data from the Geofabric FTP site](#). Select Surface Network's SH_Network.zip file and save this to disk



2. Unzip the downloaded file, making sure that the resulting folder ends with gdb (e.g. the contents of the file SH_Network.zip should be unzipped to a folder called SH_Network_GDB).

2.1.1 Create a subset of the Geofabric data

This tutorial will be using the same subset of Geofabric data as shown in the Geofabric Webinar. This subset has been created from the upstream trace from the terminus node for the Snowy River.

For instructions on how to create a subset of the national Geofabric dataset, refer to the Geofabric Tutorial "Creating a subset of Geofabric data" which is available from the:

<http://www.bom.gov.au/water/geofabric/documentation.shtml>

2.2 Create a geometric network

To create a derived catchment, a geometric network needs to be created for AHGFNetworkStream and the relevant node feature class.

If using the nation-wide Geofabric data, a geometric network will already exist in the SH Network feature dataset.

For instructions on how to create a geometric network, refer to the Geofabric Tutorial "Creating a subset of Geofabric data" which is available from:

<http://www.bom.gov.au/water/geofabric/documentation.shtml>

2.3 Set the flow direction of the network

To create a derived catchment upstream of a node, the geometric network needs to have the flow direction set according to the digitised direction.

If using the nation-wide Geofabric data, the flow direction according to digitised direction will already exist in the SH NetworkSurface Network feature dataset's geometric network.

For instructions on how to set this flow direction, refer to the Geofabric Tutorial "Creating a subset of Geofabric data" which is available from:

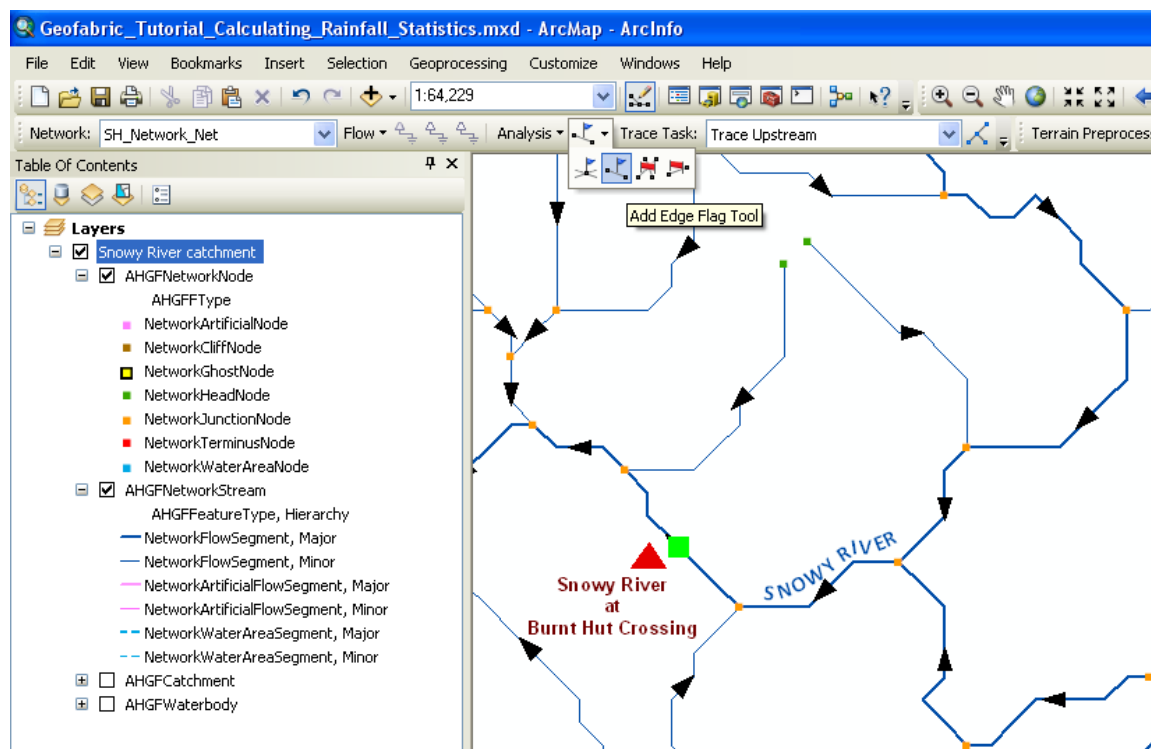
<http://www.bom.gov.au/water/geofabric/documentation.shtml>

2.4 Create a derived catchment

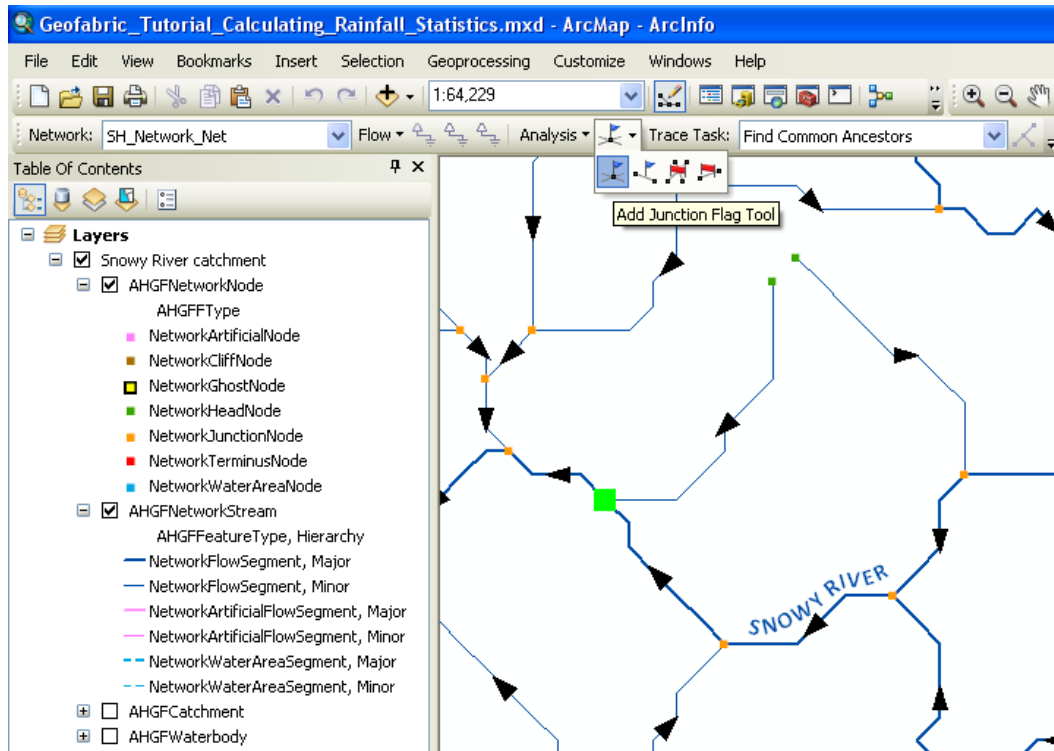
This section demonstrates the creation of a catchment from the subset of Geofabric data created in Step 2.1.1.


2.4.1 Select upstream AHGFNetworkStream segments

1. Zoom in to the area where the derived catchment will be created.
 2. Add a flag to the AHGFNetworkStream from which an upstream trace will be performed.
- If the flag is along a AHGFNetworkStream segment, choose the Add Edge Flag Tool from the Utility Network Analyst toolbar and click on the node to add a flag for network tracing (green box in figure below).

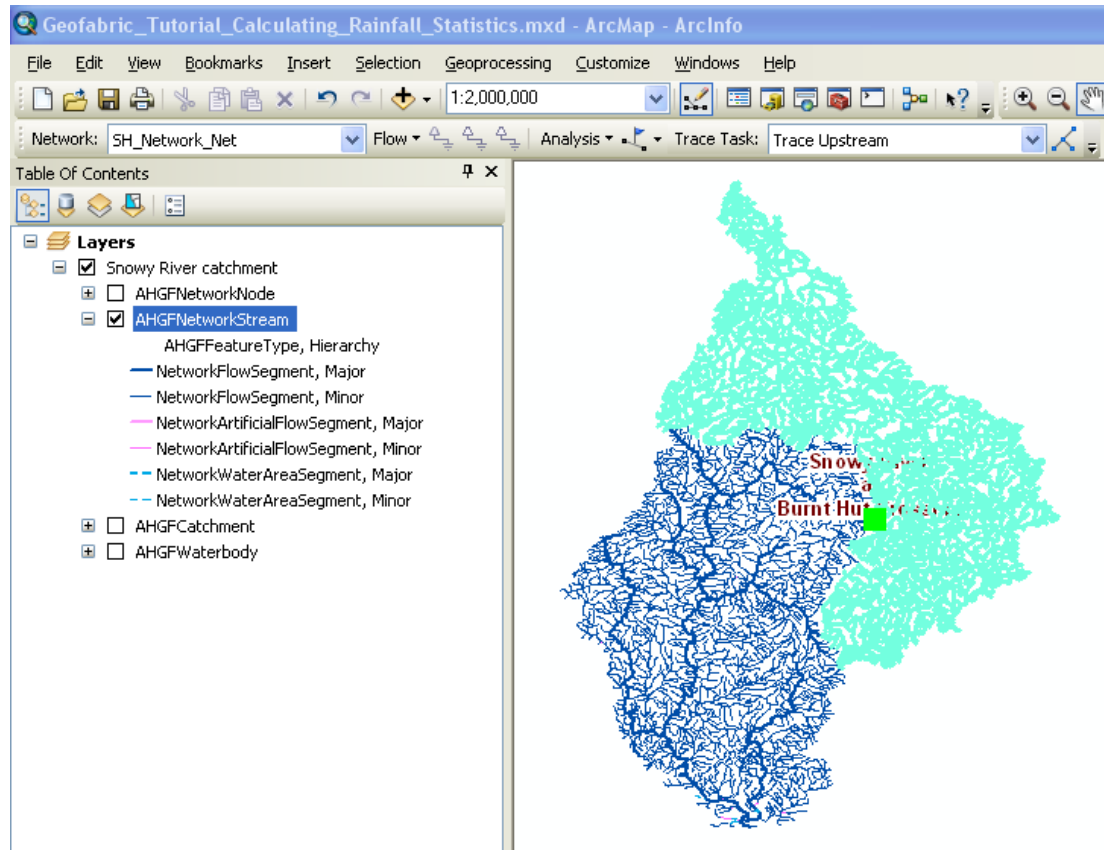


- If the flag is to be placed on a node at the end of an AHGFNetworkStream segment, choose the Add Junction Flag Tool from the Utility Network Analyst toolbar and click on the node to add a flag for network tracing (green box in figure below).



3. By default, the result of the trace operation in the next step will be displayed as red coloured drawing objects. The result of the trace operation needs to be a "Selection" and changed in Analysis > Options > Results tab to "Selection".
4. Choose Trace Upstream from the Trace Task: menu on the Utility Network Analyst toolbar.
5. Click on the Solve button () on the Utility Network Analyst toolbar in order to perform the network trace

6. All the upstream AHGFNetworkStream segments from the selected node will be selected and display on screen. Zoom out to the selected AHGFNetworkStream features to see the full catchment area.



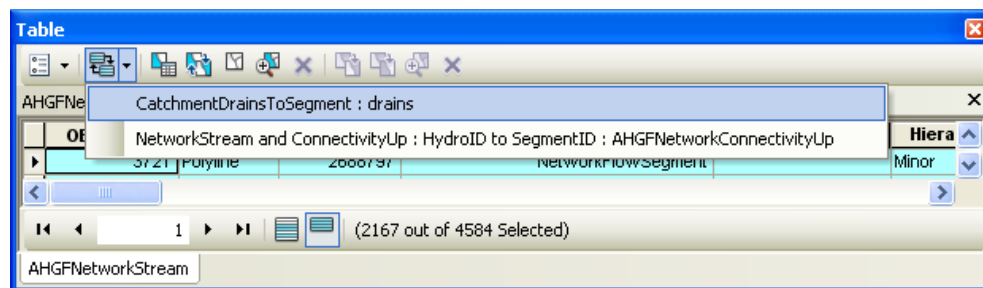
7. Open the AHGFNetworkStream table to see the selected records.

2.4.2 Select upstream AHGFCatchments polygons

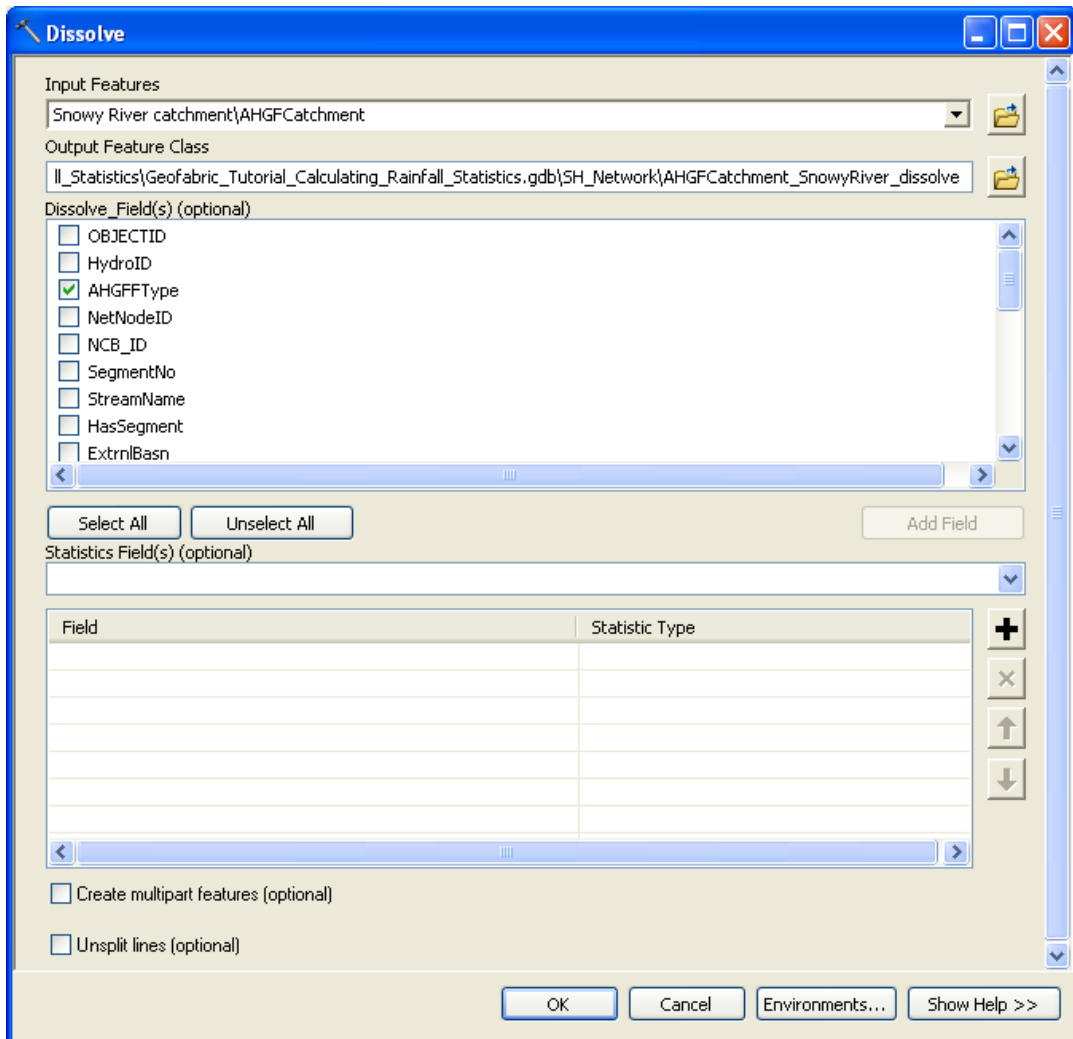
Every AHGFNetworkStream segment has its own AHGFCatchment feature. The AHGFNetworkStream Drain_Id attribute relates to the AHGFCatchments Hydro_ID attribute

The selected records in the AHGFNetworkStream table can be related to the AHGFCatchments table using the supplied CatchmentDrainstoSegment relationship.

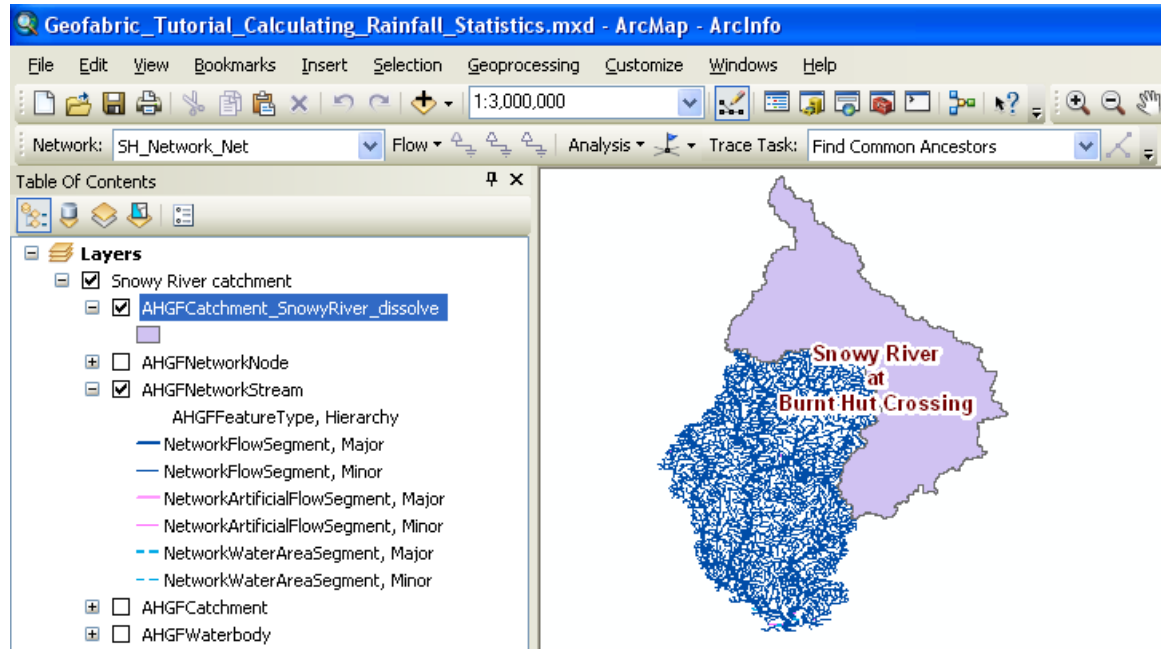
1. In the AHGFNetworkStream table, click on the CatchmentDrainstoSegment : drains relationship.



2. The AHGFCatchments table will automatically open and display its related selected records. Dissolve these selected features in to one catchment feature by using the ArcToolbox > Data Management > Generalization > Dissolve tool. Enter the AHGFCatchments layer as the Input Features, name the Output features and select the Dissolve field as AHGFFtype. The Create multipart features box is to be unchecked. Click [OK].



3. The dissolved catchments layer will automatically be added to the Table of Contents and displayed on screen. This catchment will now be used for calculating the rainfall summary statistics in that area.

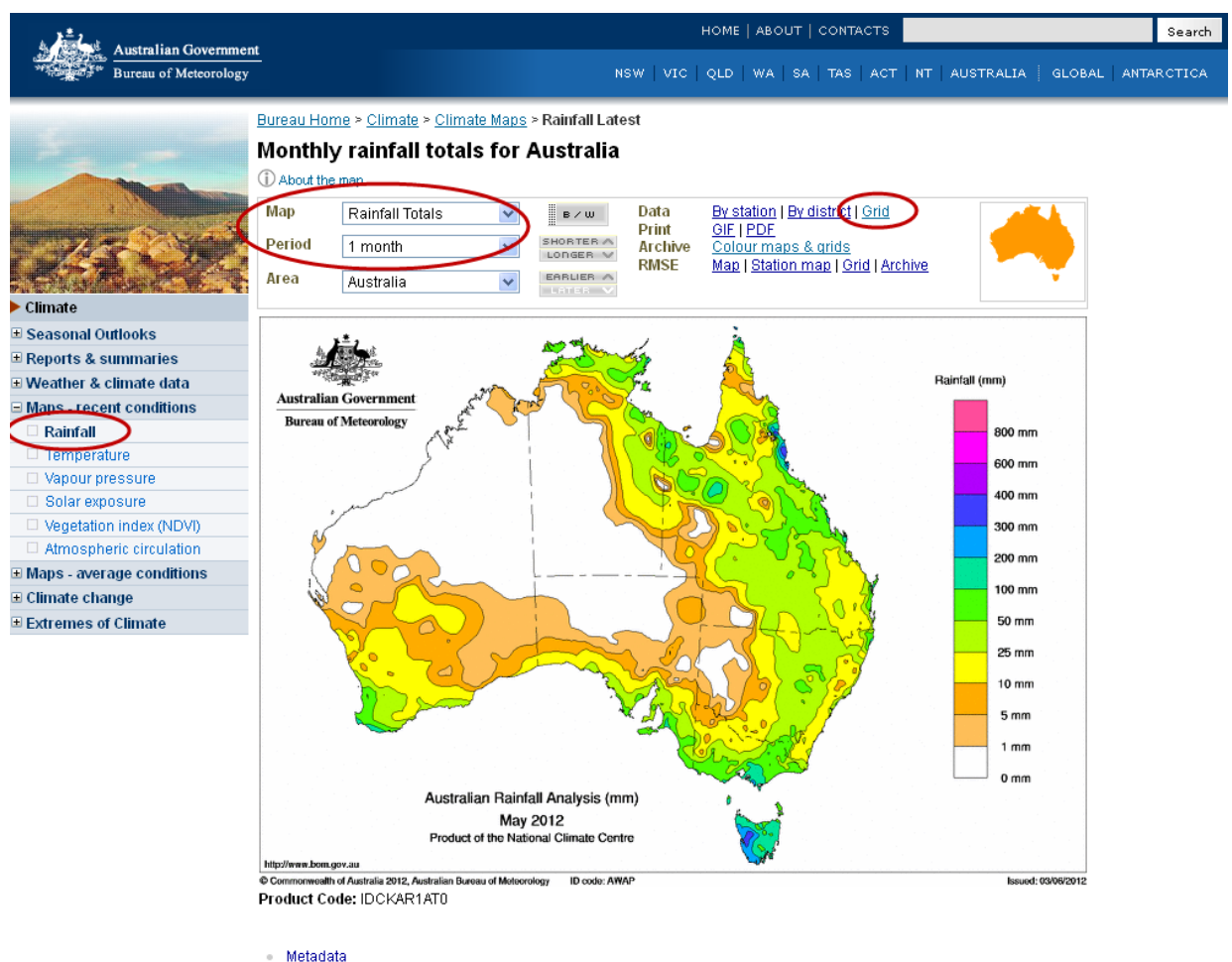


2.5 Calculate rainfall summary statistics

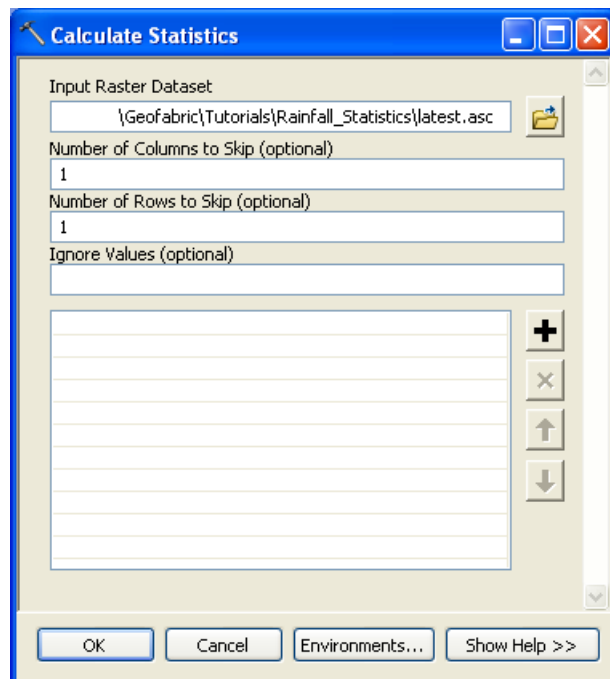
Rainfall data is available from the Bureau's website in GRID format. This data format is currently only available for the Rainfall Totals time period of one day, one week and one month.

2.5.1 Add Bureau rainfall data

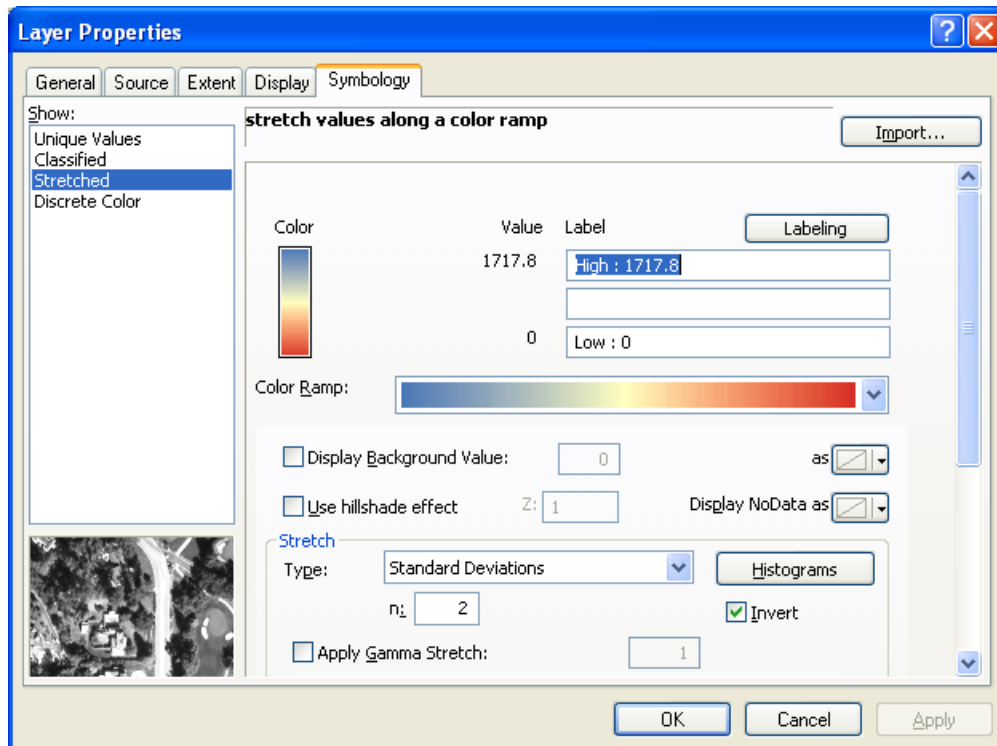
1. Go to the Bureau's website <http://www.bom.gov.au/index.shtml?ref=logo>
2. Go to the rainfall data using the left hand navigation's Climate & Past Weather > Maps recent conditions > Rainfall
3. Select Map to show Rainfall Totals, Period to be one month.
4. Click on the Data GRID format, which will download the rainfall data as ASCII GRID format. Save the ZIP file and extract the file. Rename the extension of the latest.grid file to latest.asc so that it can be added to ArcMap.



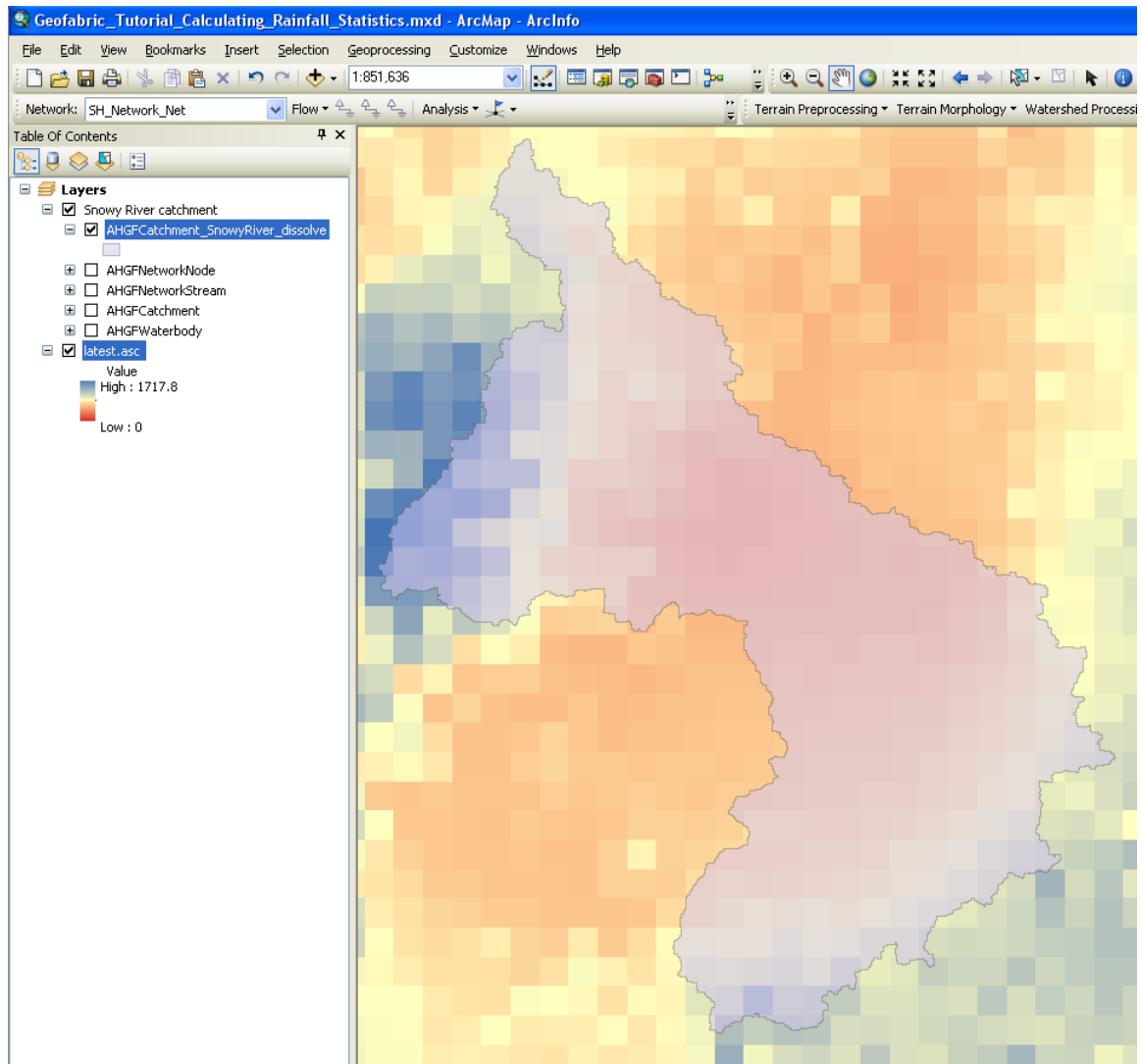
5. Archived GRID data can be accessed by clicking on Colour maps & grids. Select the Year and Month to display the data. Download the GRID data by clicking on Download the monthly grid link underneath the map.
6. To symbolise, and later calculate, the actual values in the GRID file, go to ArcCatalog, right click on the latest.asc file and select Calculate Statistics. Accept the default input and click [OK].



7. Add the renamed file to the MXD and symbolise:
- Select a Color Ramp
 - Click on Invert if colours in the Color Ramp need to be inverted
 - Select Stretch Type to Standard Deviations

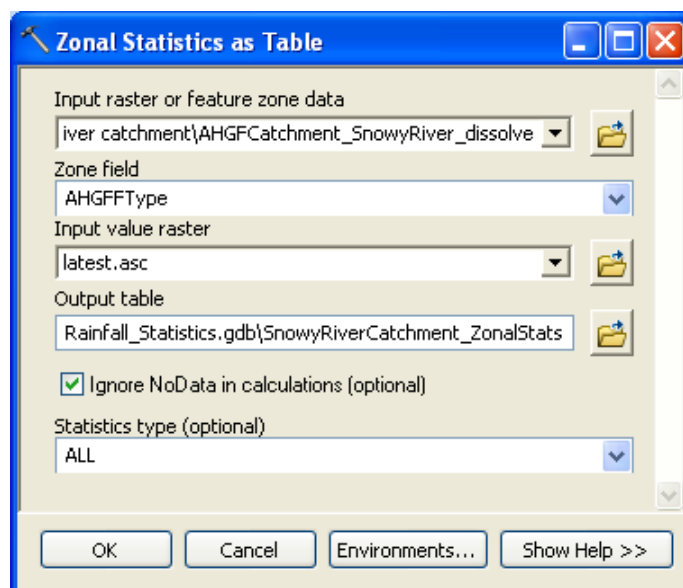


8. The latest.asc file will display as follows, where the derived catchment has 50% transparency:



2.5.2 Output Zonal Statistics as a Table

1. Turn the Spatial Analyst extension on in ArcMap.
2. To calculate and output the rainfall summary statistics for the catchment area in table format, go to ArcToolbox > Spatial Analyst > Zonal > Zonal Statistics as Table.
3. Complete the parameters as follows:
 - Input raster or feature zone data – dissolved AHGFCatchment layer
 - Zone field – AHGFFtype
 - Input value raster – latest.asc
 - Output table – save the table to the FGDB
 - Check the box for Ignore NoData in calculations
 - Select Statistics Type to be ALL to output all the rainfall summary statistical values
4. Click [OK]



5. The table will be automatically added to ArcMap. Open the table to view the rainfall summary statistics.

SnowyRiverCatchment_ZonalStats										
	OBJECTID *	AHGFFTYPE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM
▶	1	21	292	0.73	154.39999	497.89999	343.5	239.92877	71.844337	70059.203

2.4.2 Select upstream AHGFCatchments polygons

Every AHGFNetworkStream segment has its own AHGFCatchment feature. The AHGFNetworkStream Drain_Id attribute relates to the AHGFCatchments Hydro_ID attribute

The selected records in the AHGFNetworkStream table can be related to the AHGFCatchments table using the supplied CatchmentDrainstoSegment relationship.

1. In the AHGFNetworkStream table, click on the CatchmentDrainstoSegment : drains relationship.

