# The ACRU Hydrological Response Unit Delineation Tool Guide

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# DOCUMENT REVISIONS

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# 1 INTRODUCTION

## 1.1 Scope and Purpose

This document describes the delineation of hydrological response units (HRU) for the Agricultural Catchments Research Unit (ACRU) agro-hydrological modelling system. This document is meant for both users of the ACRU model who wish to setup and run the ACRU model. The process of compiling spatial data for the ACRU model can combined with ArcGIS for Desktop environment under a Windows® operating system.

The ACRU-HRU Delineation Tool was developed to automate the delineation of hydrological response units (HRU) for the ACRU (v 336) model. The creation of HRU is a key step in utilizing ACRU in a distributed mode. Spatial data are pre-processed where raster data are often resampled according to the user's specification for a particular watershed. Essentially, the tool allows the user to automatically delineate the HRU using ArcPY modules available in ArcGIS for Desktop.

## 1.2 Tool Overview

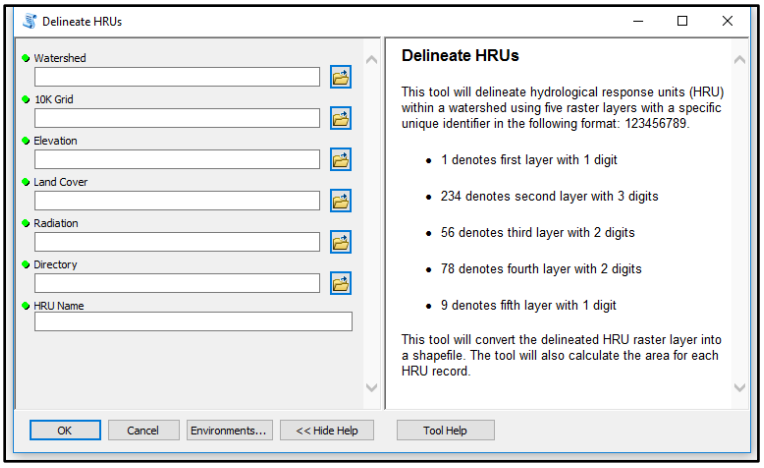



Figure 1-1 The ACRU-HRU Delineation Tool graphical user interface (GUI)

**Procedure:**

1. Locate the first raster file.
2. Locate the second raster file.
3. Locate the third raster file.
4. Locate the fourth raster file.
5. Locate the fifth raster file.
6. Locate the directory to save the output file.
7. Enter the name of the file.

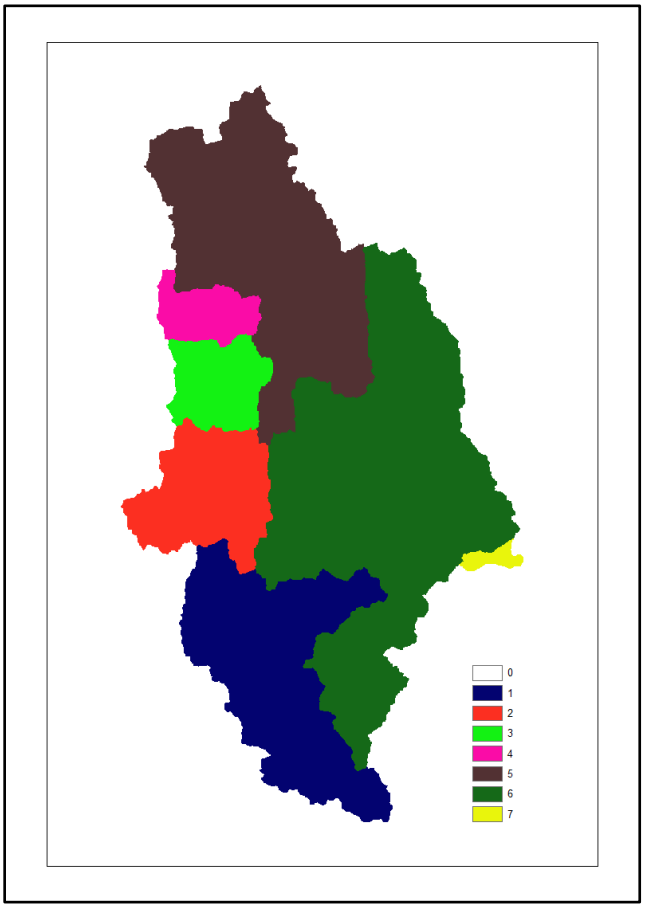
# 2 Spatial Layers

The ACRU-HRU Delineation Tool was used to delineate hydrological response unit for the Oldman Reserver Watershed, located in southern Alberta. The each of the spatial layers were resampled specifically due to the unique identifier. Here, we used five raster layers with a specific unique identifier in the following format: 123456789.

- 1 denotes first layer with 1 digit
- 234 denotes second layer with 3 digits
- 56 denotes third layer with 2 digits
- 78 denotes fourth layer with 2 digits
- 9 denotes fifth layer with 1 digit

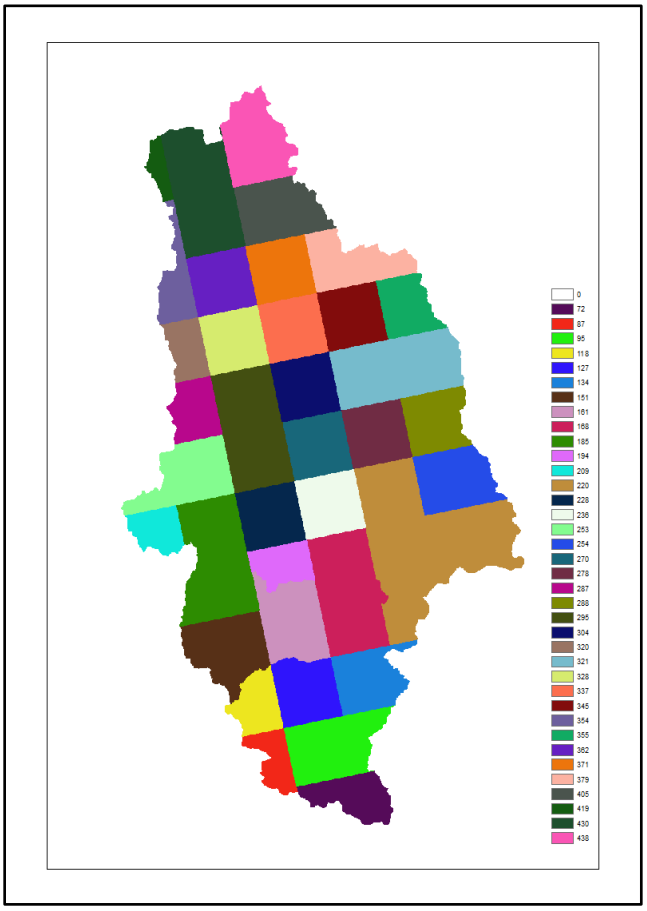
In order to create this unique identifier using Python, the following expression was used:
( layer1 * 100000000) + ( layer2 * 100000) + ( layer3 * 1000) + ( layer4 * 10) + layer5

## 2.1 Layer One Sample



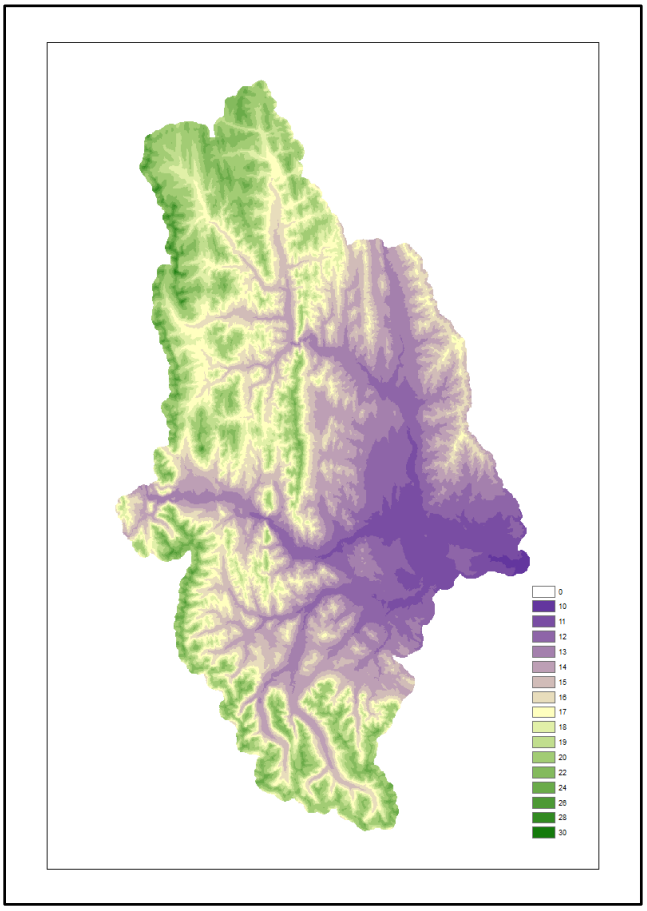

For the Oldman Reservoir Watershed, the sub-watershed data was selected as the first layer. The raster layer is multiplied by 100000000 in order to setup the specific unique identifier in the following format: 123456789. Here, 1 denotes the first layer using 1 digit placeholder.

## 2.2 Layer Two Sample



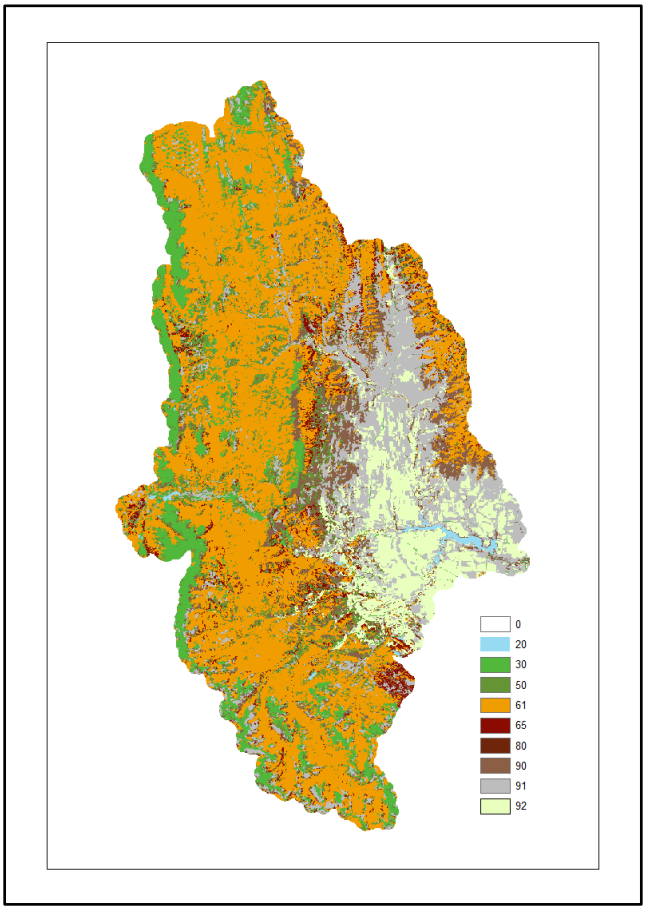

The gridded 10K data was selected as the second layer. The raster layer is multiplied by 100000 in order to setup the second set of identifier. Using this format where unique identifier is 123456789, the identifier 234 denotes second layer using 3 digit placeholder.

## 2.3 Layer Three Sample



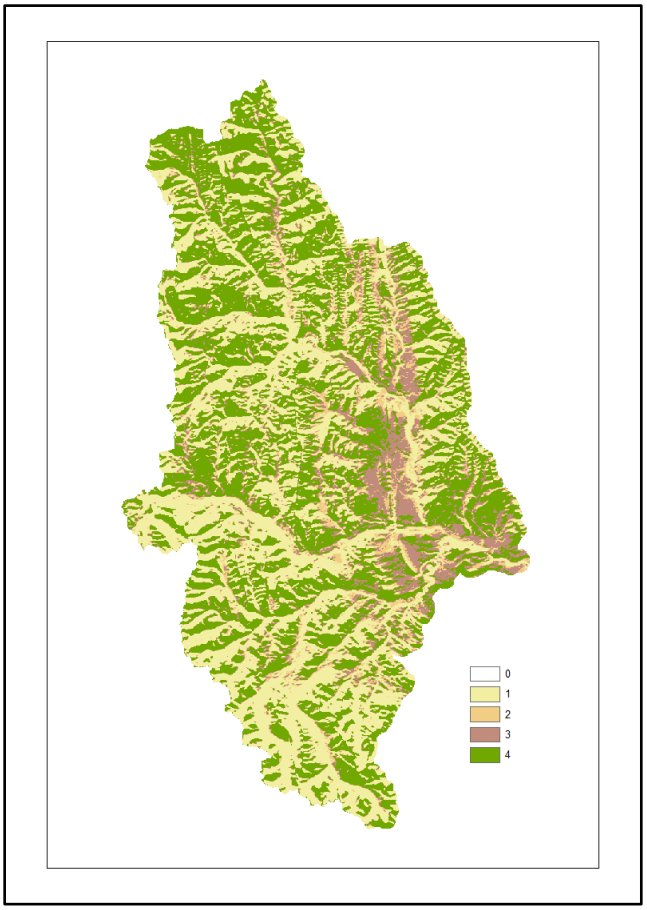

Theelevation data was selected as the third layer. The raster layer is multiplied by 1000 in order to setup the third set of identifier. Using this format where unique identifier is 123456789, the identifier 56 denotes third layer with 2 digit placeholder.

## 2.4 Layer Four Sample




The land cover data was selected as the fourth layer. The raster layer is multiplied by 10 in order to setup the fourth set of identifier. Using this format where unique identifier is 123456789, the identifier 78 denotes fourth layer with 2 digit placeholder.

## 2.5 Layer Five Sample




The aspect data was selected as the fifth layer. In this layer, using this format where unique identifier is 123456789, the identifier 9 denotes fifth layer with 1 digit placeholder.

# 3 ArcGIS Resources

For setting up script tool in ArcGIS, see the links below:

http://desktop.arcgis.com/en/arcmap/10.3/analyze/creating-tools/adding-a-script-tool.htm

http://desktop.arcgis.com/en/arcmap/10.3/analyze/creating-tools/setting-script-tool-parameters.htm

**If you encounter issues not addressed by this user guide, please contact Charmaine Bonifacio for additional support**