# Characterizing Riparian Vegetation Using the Riparian Classification from LiDAR (RCL) Tool in ArcGIS

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## Abstract

*The Riparian Classification from LiDAR (RCL) tool is a Python script designed to classify riparian land cover. The tool accepts a folder of LiDAR binary (*.las*) files and outputs a land use raster as well as supporting data files such as digital elevation and slope models. The tool is available as an ArcGIS script tool, meaning it can be called using the same graphical user interface that standard ArcGIS tools use. This document details how to set up and use the RCL tool.*

## Assumptions

This walkthrough assumes that the user is generally familiar with ArcMap and has already obtained LiDAR data in *.las* format for their study area, either by directly downloading *.las* files or unpacking *.laz* (compressed *.las*) or *.zlas* (ESRI compressed *.las*) files. It is not necessary that the user is familiar with any scripting languages. The *.las* files for the study area should be contained within a single folder with no other files.

The RCL tool requires valid Spatial and 3D Analyst licenses to run.

## Walkthrough

1. *Downloading the RCL Tool*

The RCL tool can be found at <https://github.com/rsjones94/nrcs_rcl>. To download the tool, click the green “Clone or download” button and select “Download ZIP”. Unpack the zipped folder in a location that can be easily found later. This folder contains the RCL Python script and the associated ESRI Toolbox file, as well as supporting documentation (including this file).

1. *Running the RCL Tool*

To open the RCL interface, open ArcCatalog. The Catalog can be accessed either directly in the ArcCatalog application or through ArcMap by clicking the “Catalog” button in the toolbar. In the Catalog navigate to the folder downloaded in the previous step. Double click on *rcl.tbx* to expand it, then double click the *Riparian Classification from LiDAR* tool to open the tool dialogue. A graphical user interface similar to standard ESRI tools should appear. Fill each field as instructed by the tooltips. When ready, hit run. Processing time varies with study area size and LiDAR point density. For large study areas (*.las* files totaling over 10gb) processing times of 30 minutes and beyond are common. Tool progress can be monitored under “Messages” in the Results pane, which is accessible in the Geoprocessing dropdown menu. The tool progress through the following steps:

Generating multipoint files > Generating TINs and elevation rasters >

Generating slope rasters > Classifying cover > Classification complete

Once the tool has finished running, the classification raster can be found in the output folder specified in the tool parameters along with a support folder full of supporting data products. The values in the classification raster are 1 (trees), 2 (other vegetation), 3 (all other cover) or 0 (NoData).

## Model Details and Limitations

It is recommended that all the LiDAR data for the study area is coterminous. The tool attempts to generate interpolated rasters, meaning large data gaps due to distant, unconnected LiDAR tiles will be interpolated across even if the distance is large. This results in unnecessary computations and large output files, as well as areas of meaningless classification. These meaningless classifications will also occur at the junctions in non-square study areas.

Additionally, though this model is most accurate within the riparian corridor, it will output a raster that classified the entirety of the LiDAR input. Because classification done outside the riparian corridor has limited accuracy, it is recommended that the user either clip the output classification using a riparian buffer polygon or clip the input LiDAR using a tool such as LASclip (from the LAStools toolbox) or the Extract LAS tool in ArcMap. The pre-clipping data will reduce processing time. As noted above, LiDAR input that is not square will result in meaningless classifications outside the limits of the LiDAR input which much be cleaned up after processing.

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