

The least cost path of proposed trails in the Chismore Range area on Porcher Island

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Introduction

The question being asked in this project is “what is the least cost path of proposed trails in the Chismore Range area on Porcher Island?” The area that is being looked at is the Chismore Range; this is a mountain on Porcher Island North-West of the small community of Oona River. Four spots are used as the connection points for the trails, these spots are the trail start, a rest stop, a lookout point, and a campground. Using analysis tools the best trail paths between the points was found. The data for the map was gathered from the web site Geogratis, and consisted of the NTS sheets 103G16 & 103J01.

Method

- The first step was to gather the data required from geogratis for the NTS sheets 103G16 & 103J01 and use the Data Management Tools-> General-> Merge tool to combine the data from each NTS sheet into a single data file. The data merged included roads, rivers, water, and contours.
- After the data was merged and organized the Reproject tool was used to project all the data into the same projection of Nad 83 UTM Zone 9N.
- A DEM was created next using the merged contour lines and the tool 3D Analyst-> Raster Interpolation-> Topo to Raster.
- With the new DEM layer, Hillshade and Slope layers were created next using the tool 3D Analyst-> Raster Surface-> hillshade/slope.
- In ArcCatalog a new polygon shapefile was created and named Boundary, the file was then edited with the Editor Toolbar. The Boundary for the area was created by creating a new polygon around the study area.
- Next all of the data was clipped to the new Boundary. Used Analysis Tools-> Extract-> Clip to clip the vector data. For raster the Data Management Tools-> Raster-> Raster Processing-> Clip was used. To get the raster to clip to the irregular shaped Boundary, the Boundary layer had to be used as a mask while clipping the raster layer.

- The following step is to create a flow accumulation layer, in order to do this the fill tool, and flow direction tool are needed. The first part is to use Spatial Analyst Tools-> Hydrology->fill to fill the holes in the DEM layer. Next you use the DEM created through fill with Spatial Analyst Tools-> Hydrology-> Flow Direction to create a Flow Direction layer. The Flow Direction layer can then be used with Spatial Analyst Tools-> Hydrology-> Flow Accumulation to create the Flow Accumulation layer.
- Using the layers Slope, Landuse, & Flow Accumulation and the reclassify tool, found under 3D Analyst-> Raster Reclass-> Reclassify, to create a cost layer for each.
- The three cost layers are then combined together using Spatial Analyst Tools-> Map Algebra-> Raster Calculator and the equation (cost_slope + cost_flow + cost_landuse).
- A new point shapefile is created in ArcCatalog and brought over to ArcMap. Using the Editor Toolbar the four points Trail Start, Rest Stop, Lookout, and Camp Ground are created. The Attributes area also filled in using the editor tool.
- Next the point, Trail Start, was selected and a cost distance and cost back link were created. This was accomplished using the Spatial Analyst Tools-> Distance-> Cost Distance, and Spatial Analyst Tools-> Distance-> Cost Back Link. This was also done for the Rest Stop point.
- To create the least cost trails the tool Spatial Analyst Tools-> Distance-> Cost Path is used. The Rest Stop point was selected and the first trail created was from Trail Start to Rest Stop. Next Lookout was selected and the cost path from Rest Stop to Lookout was created. For the third trail Camp Ground was selected and Trail Start was used for the cost path.
- After all the cost paths are made the raster trails are converted into vector polylines using the Conversion Tools-> From Raster-> Raster to Polyline.
- The vector polylines are then merged into one file using Data Management Tools-> General-> Merge.
- A Viewshed is created next using the Spatial Analyst Tools-> Surface-> Viewshed. The viewshed uses the portion of the trail between Rest Stop and Lookout as its view point. The Viewshed shows the area that is visible as you walk from the rest stop up to the lookout point.
- The last step is to add auxiliary data and make the map presentable.

