Possible sites for new campsites and a new trail in E.C. Manning Park

Bethany Hunter
2013

Introduction

E.C. Manning Provincial Park is a beautiful, mountainous getaway just three hours' drive from Vancouver. I have stayed at the park every winter for the last twenty years and have watched it struggle through financial setbacks and restructuring. The ski hill connected with the resort is a major draw in the winter months, as ticket prices are reasonable and it is close enough to the Lower Mainland that one can drive in, ski, and drive home within the same day. In the summer there are many trails to hike, rivers to canoe, and lakes to play in. The only campsite I have stayed at was unpleasantly devoid of tree cover and seemed too close to the major road through the area: Highway 3. This project aims to find possible areas to expand the offerings of summer campsites. Perhaps, if there are more quiet, well-treed areas available the resort will gain more year-round clientele. I have also proposed a new trail from the Manning Park Lodge to the top of the highest peak in the park, Mt. Frosty, which is around 2430 m in elevation. Keeping in mind the recently delicate financial state of the park, I have designed the trail using a least cost path.

Site Constraints

The constraints for site placement were fairly common for campsites. I chose to place the potential sites within 100 m of water resources and 200 m of the local area roads, which do not have very much traffic. Another consideration was the proximity to Highway 3, and I chose to allow a 200 m buffer between potential sites and the highway. Areas near the major route could be nearly ideal, though, due to the road being generally in valleys, where there is plenty of tree cover, water, and flat land. Thus, sites were considered within 500 m of, but not closer than 200 m from, Highway 3. In a region such as Manning Park, daylight hours are shortened by the height of the mountains all around and, therefore, aspect plays an important role in enjoyment of a site. I chose to constrain the potential campsites to south-facing areas (including south-east and south-west) to maximize available sunlight. The mountains also make finding flat terrain a bit difficult, but nobody wants to camp on a sloped site so I searched for areas with less than 5° slope as a maximum allowable gradient. Likewise, although I am sure there are those who would love nothing better than camping on the bare rocks at the top of a mountain, many people prefer tree cover of some sort in an ideal campsite. The forest cover was, thus, restricted to the Balsam-Fir zones which dominate the forested areas of the park. A final consideration was made for potential sites located on wetlands or in one of the few cut-blocks in the park. Sites in either of these undesirable locations were removed from analysis.

Methods

Data acquisition for this project was nearly all from the UNBC GIS Lab Data Download site (www.gis.unbc.ca/resources). The park boundary was found on the Ninkasi drive at UNBC (N:\labs\bc_data\) and modified using the editor and feature to polygon tools to remove a road right-of-way and create a single polygon for the boundary. I downloaded and extracted BC Trim data (92H005-007, 015-017, & 025-027) and then merged and translated all the files using FME Universal Translator. Spot height elevation, contours, waterways, roadways, wetlands, cut-blocks, existing campsites, and buildings were obtained in this manner. Each of the layers was clipped to the Manning Park Boundary layer before further analysis was done. Using select by attribute, I extracted layers for paved and unpaved roads, riverbanks, and streams. I edited the riverbanks layer by adding lines to close the clipped ends of the rivers and then converted the line feature, riverbanks, into a polygon feature, rivers. Lakes, wetlands, existing campsites, cut-blocks, and buildings were likewise extracted each into new layers then converted into polygons using the feature to polygon tool. The streams which did not fall into the category of rivers were line features and were left as such.

Using the buffer tool, I created a 100 m buffer around each of the types of water feature (rivers, streams, and lakes) then used the union tool to merge the buffers into one layer. Likewise, a 200 m buffer was created for each of the road types (paved and unpaved) and an additional 500 m buffer was made for the paved roads layer. I then used the erase tool to create the appropriate 200 m – 500 m buffer for the paved roads. The two road buffer layers were then merged using the union tool. The water feature buffer layer and the road buffer layer were then intersected to yield a series of polygons which would then be further analyzed (Fig. 1).

BC Vegetation Resources Inventory (VRI) data was downloaded to determine the forest cover of the proposed sites. The SPEC_CD_1 field was queried for BL and the balsam-fir polygons were extracted into a new layer. The resultant layer was then clipped to the park boundary.

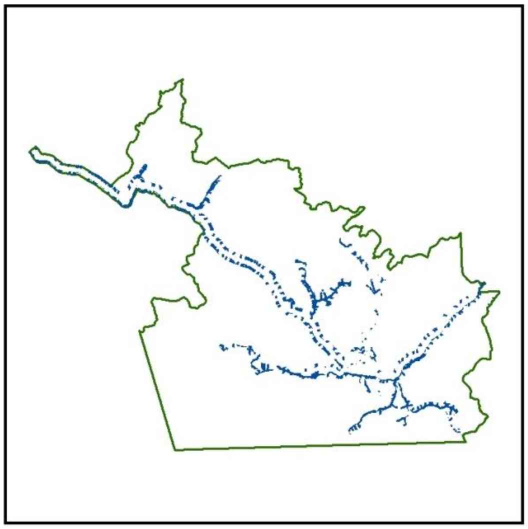


Fig. 1: Intersected water and road buffer layers

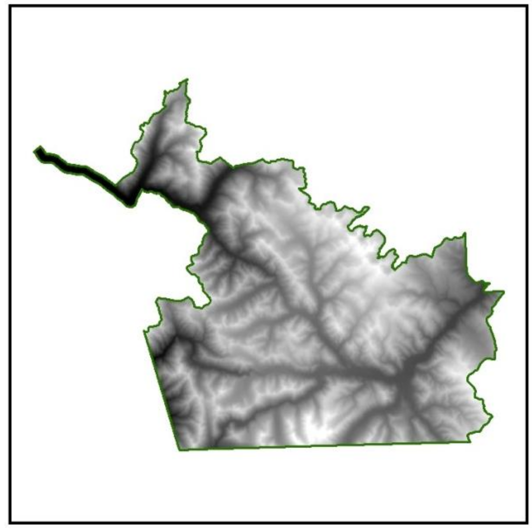


Fig. 2: Depressionless DEM

A raster DEM was created using the topo to raster tool with contours, spot heights, streams, lakes, and the park boundary as inputs. I then created a depressionless DEM (Fig. 2) using the flow direction, sink, and fill tools. A slope layer was then created from the new DEM. Likewise, layers for aspect, hillshade, flow direction and flow accumulation were all made using the depressionless DEM.

To obtain areas with slopes less than 3°, I first reclassified the slope layer, with the first class being slopes up to 3° (Fig. 3), then converted the raster into a polygon layer based upon the reclassifications. The next step was to extract the polygons which had the appropriate (3° or less) slopes into a new layer (slope_3).

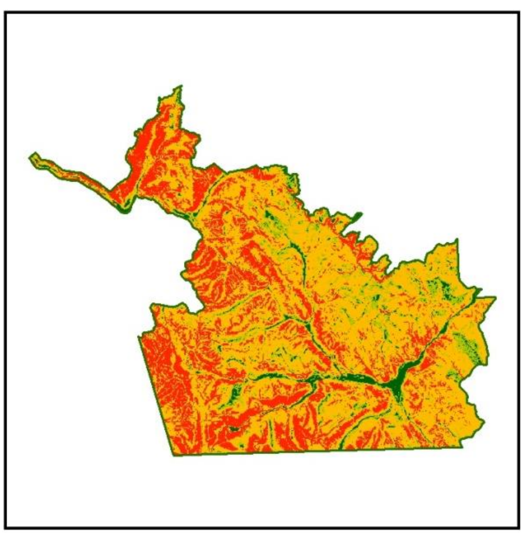


Fig. 3: Reclassified slope raster

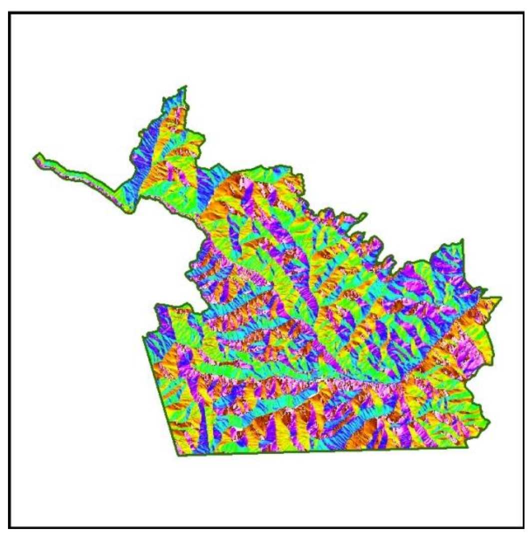


Fig. 4: Aspect raster

A similar process was used to extract the generally south-facing slopes from the aspect layer (Fig. 4). Three classes were used: south, south-east, and south-west. The resulting polygon layer (aspect_south) was used in further analysis.

The roads and waterways buffer layer was then intersected with the BL layer from BC VRI, the slope_3 layer and the aspect_south layer.

Finally, the layers comprising cut-blocks and wetlands were overlaid onto, and erased from, the intersected analysis layer. The final output is a small number of sites that reasonably fit the constraints of the analysis. Two representative locations are seen in Inset 1 of the map, E.C. Manning Provincial Park: Proposed campsites and trail to Mt. Frosty. The largest site, which is in the upper left of Inset 1, is 3.8 ha and the smaller site in the same inset is 1.8 ha. Fourteen of the 114 potential areas were greater than 0.5 ha and could fit a few vehicles with trailers, while the remaining sites mostly have just enough area for a tent or two.

The second part of the analysis I performed on the Manning Park data was a least cost path from the Manning Park Lodge to the peak of Mt. Frosty. The slope raster was reclassified into a cost slope raster using a value of 1 for slopes up to 3°, 5 for slopes up to 6°, and 1000 for any slope above 6°. The flow accumulation raster previously created was reclassified into a cost flow raster to analyze where streams would potentially need bridges or other construction to cross. These two cost rasters were then added together using the raster calculator and the resulting layer was used to create a least cost path.
Using the spot height on the top of Mt. Frosty, cost distance and cost back link layers were created. Then, the Manning Park Lodge was selected and used as the destination for the cost path analysis. I converted the resulting raster into a polyline feature and added it to my final map product. The trail is just over 10 km long, with an elevation gain of 1231 m, which means it has an average gradient of 12% - quite steep for a trail.

Conclusion

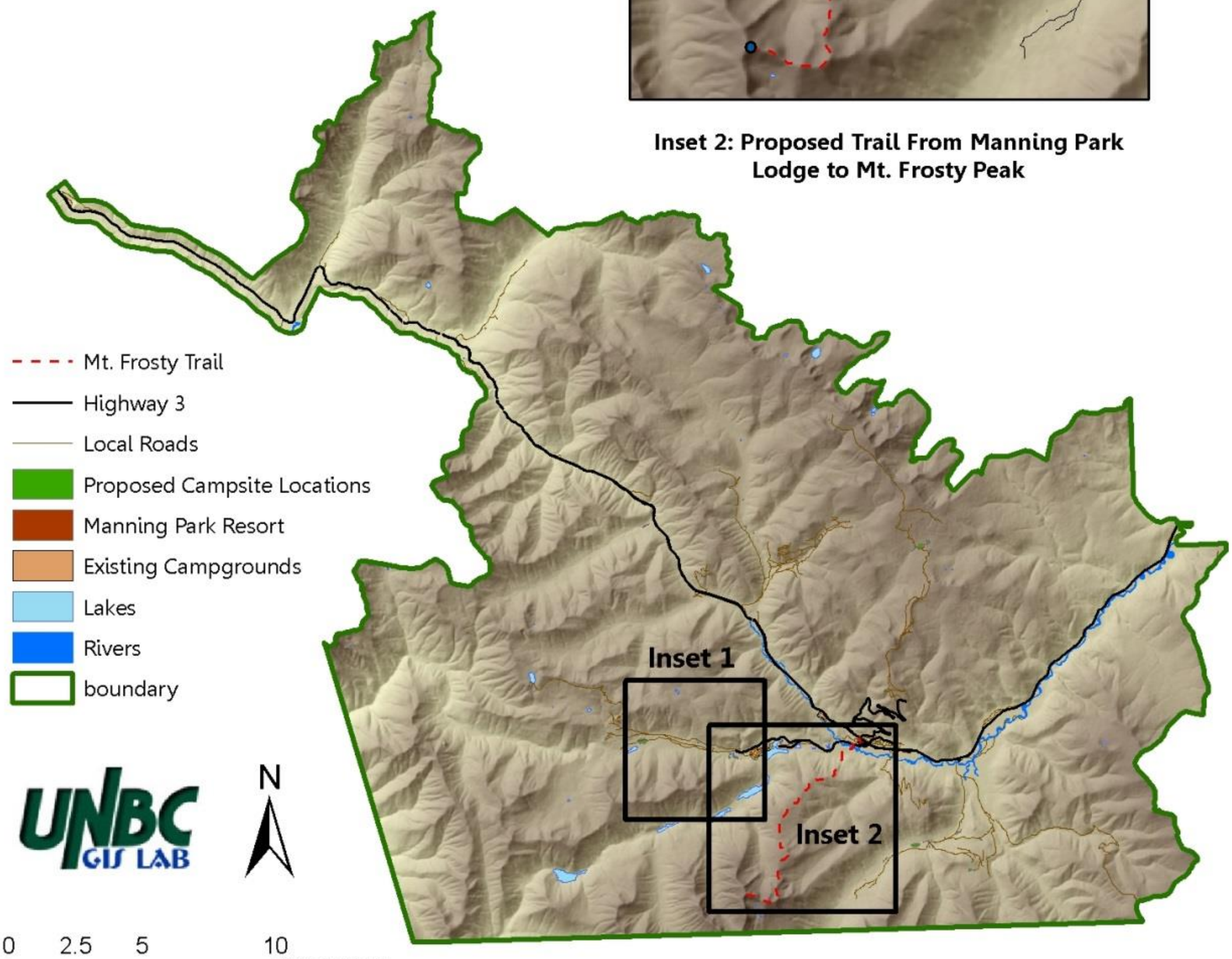
Because of the mountainous region, few viable campsite locations were found. Two of the larger areas were located on the road to the Manning Park ski hill, and one was quite close to one of the existing campgrounds. The proximity of these two sites to the lodge area is a factor that I did not look at specifically in my analysis, but it makes them attractive for development. The trail to Mt. Frosty is likely too steep for most recreational hikers, but avid climbers would surely enjoy having another peak to conquer.

E.C. Manning Provincial Park

Proposed Campsites and Trail to Mt. Frosty

Inset 1: Proposed Campsite Locations

Inset 2: Proposed Trail From Manning Park Lodge to Mt. Frosty Peak



Produced By: Bethany Hunter April 9, 2013 UNBC GEOG 413