GEOG357 Project Report:

Hugh Allen Fire, August 2018

Introduction, Study Area and Data Sources

The Hugh Allen drainage is located ~50 km south of Valemount, directly east of Kinbasket Lake, British Columbia, approximately at 52° 24’ N and 118° 31’ W. In August of 2018 there was a large, high intensity wildfire that burned much of the drainage from the valley bottom to the treeline. The goal of this study was to estimate the burned area and the approximate distribution of different burn intensities of the wildfire.

For the purpose of this study, satellite imagery was required before and shortly after the fire. EarthExplorer from the United States Geological Survey was used to download the Landsat 8 satellite images. The most immediate post fire image available was on September 19, 2018 (Figure 2.). In order to find a pre-fire image during the same time of year, an image from September 13, 2016 (Figure 1.) was selected. Both images were cloud free in the study area.

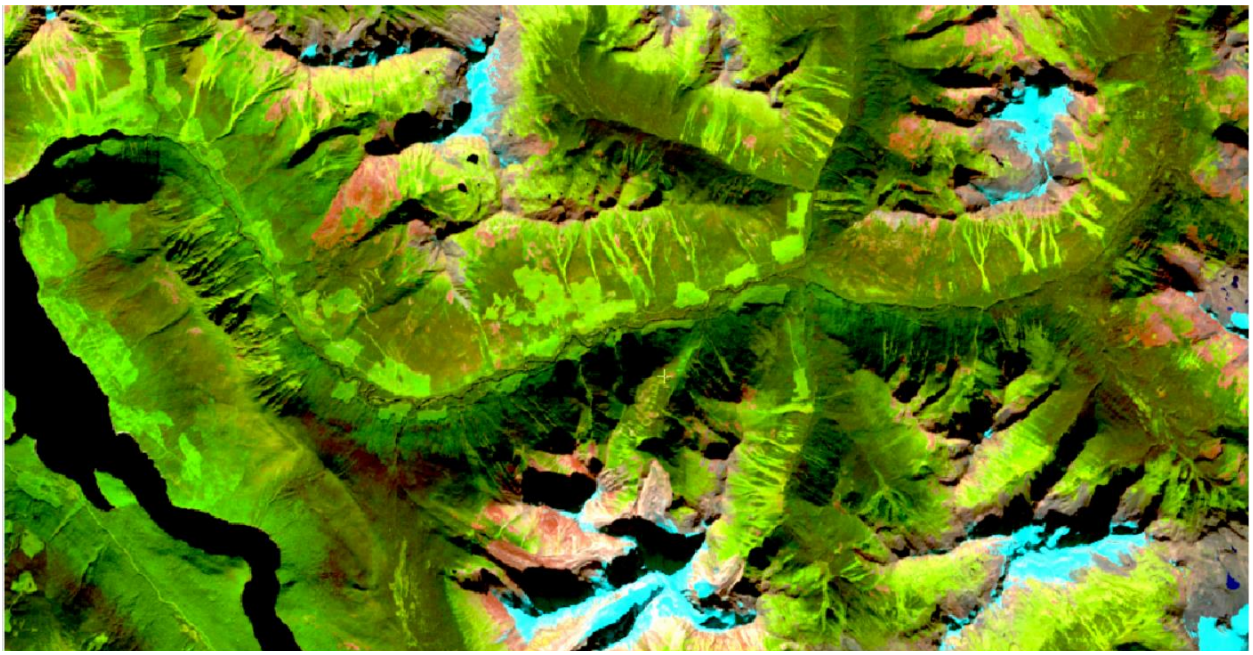

Figure 1. Landsat 8 image of the Hugh Allen Drainage, from September 13, 2016. Displayed in mid infrared, near infrared and red bands.

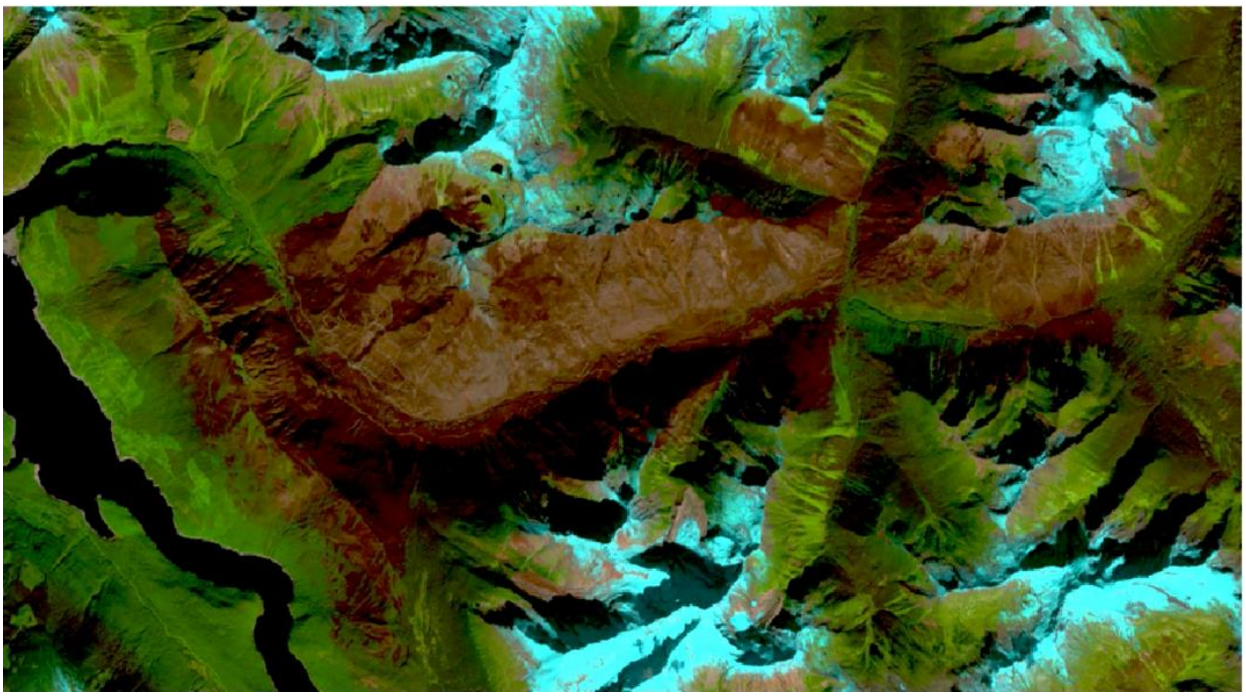

Figure 2. Landsat 8 image of the Hugh Allen Drainage, from September 19, 2018. Displayed in mid infrared, near infrared and red bands.

Data Methods and Analysis.

- Construct a normalised difference burn ratio (NBR) raster layer for the 2018 and 2016 images using the raster calculator ((Near IR – Mid-IR2) / (Near IR + Mid-IR2)) (Figure 3.)
- Subtract NBR 2016 – NBR 2018 in raster calculator to create new raster layer
- NBR 2016 – NRB 2018 layer queried for digital numbers
- Create bitmaps using THR based on these threshold values in the NBR difference layer:
  - Burned area; all values greater than 0.15
  - Low intensity burn; between 0.15 and 0.3
  - Mid intensity burn; between 0.3 to 0.5
  - High intensity burn; greater than 0.5
- Bitmaps converted to polygons using BIT2POLY tool
- Polygons smoothed using SMBOYLE
- Delete outliers and small polygons in Attribute Manager
- Determine total areas of each polygon in the Attribute Manager

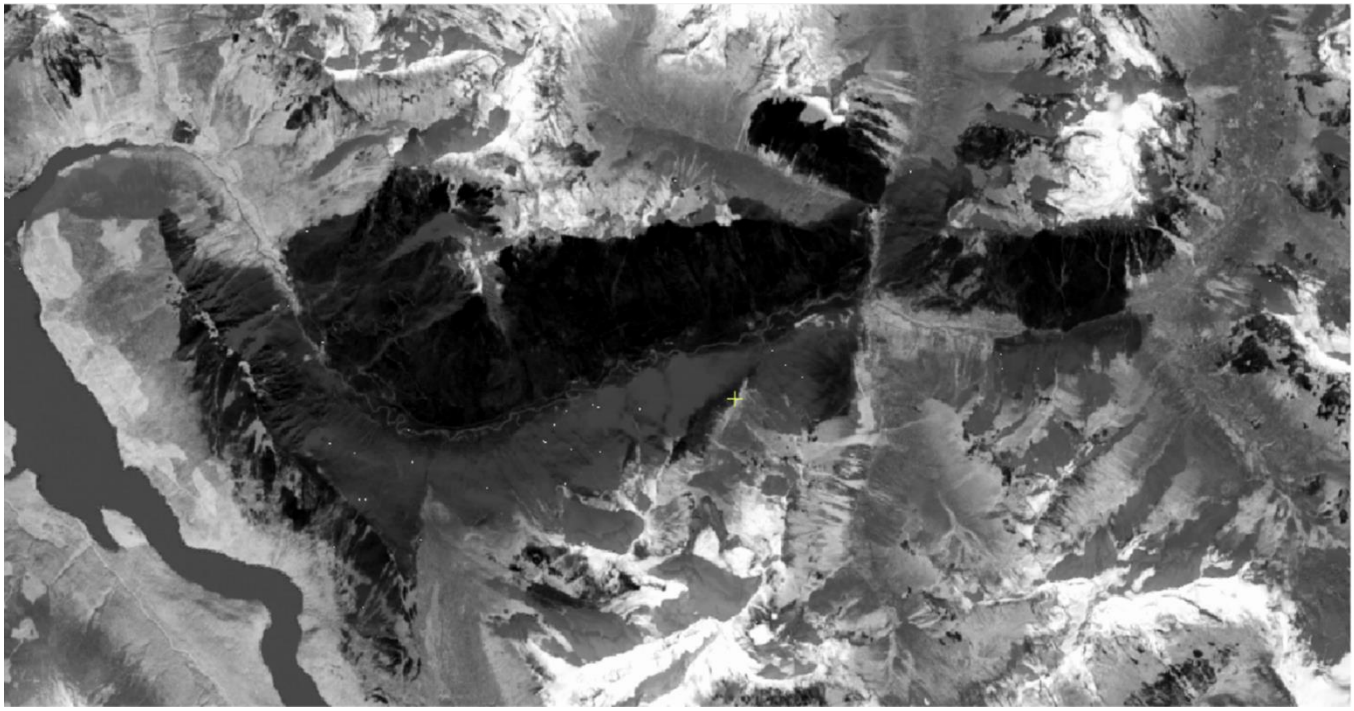

Figure 3. Normalised difference burn ratio of Figure 2.

Figure 4. NBR 2016 - NBR 2018.

Results

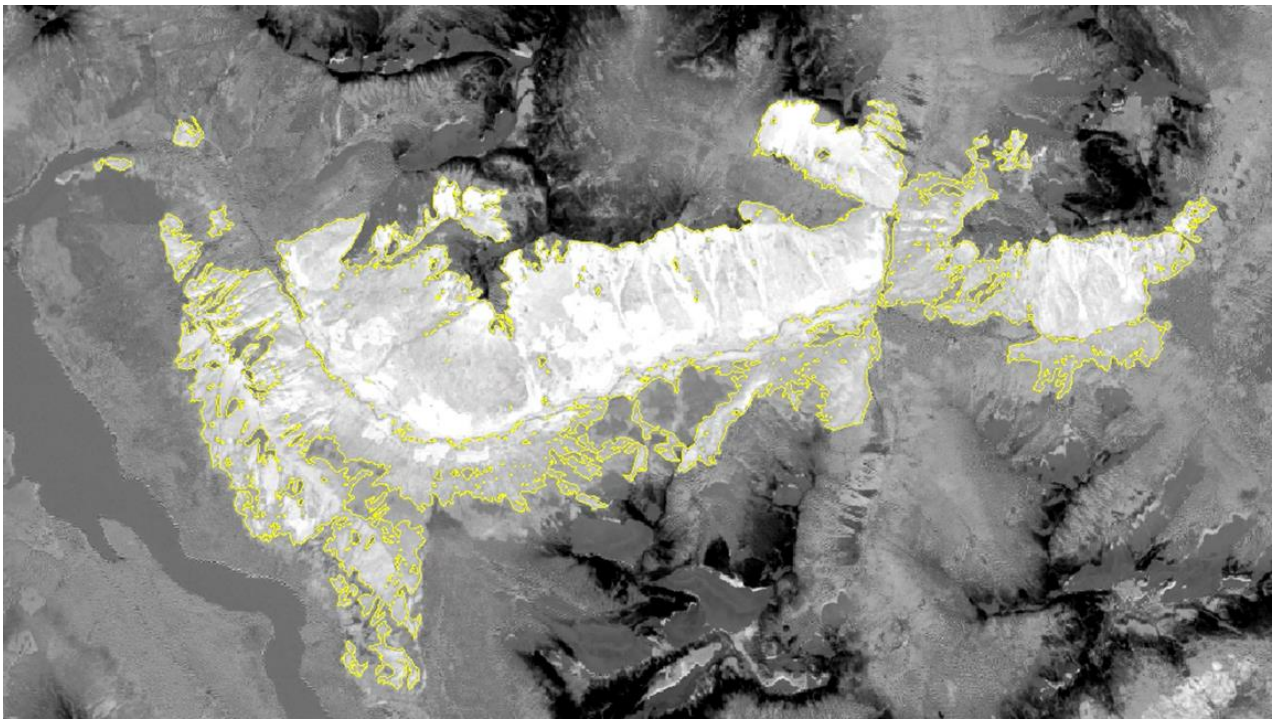

Figure 5. The total burned area.

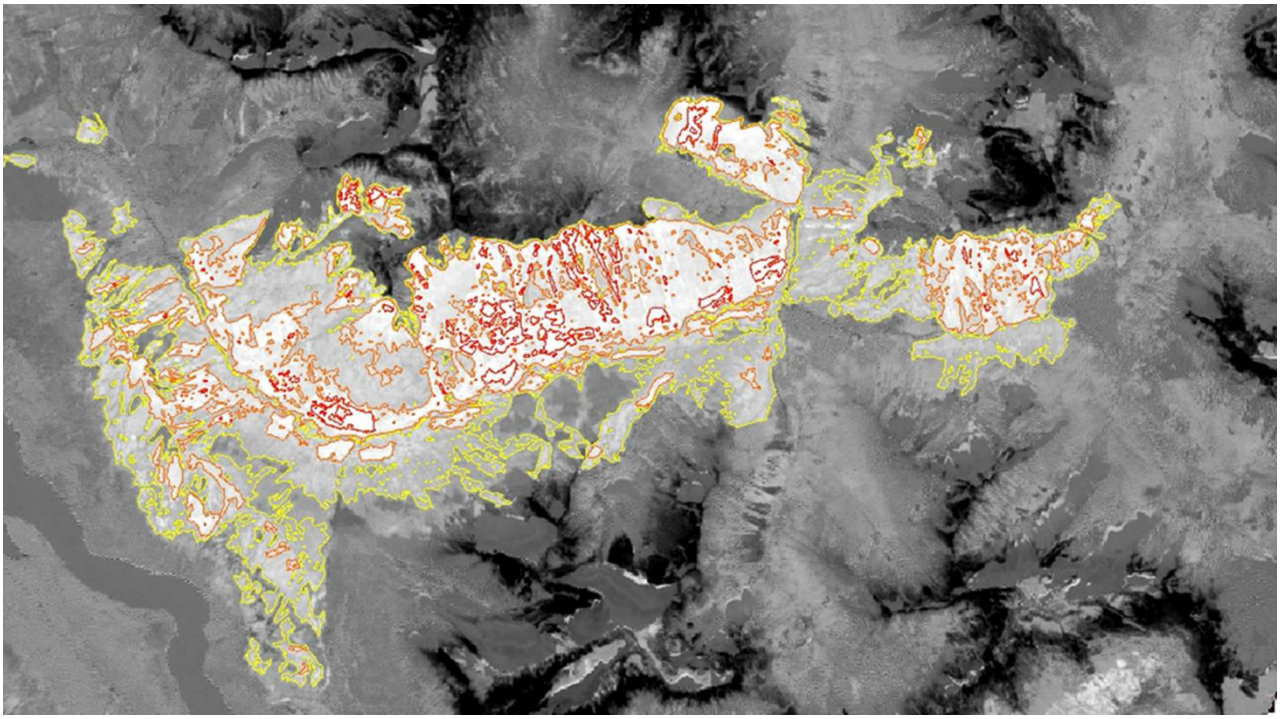

Figure 6. The distribution of burn intensity of the Hugh Allen fire. Low intensity is indicated in yellow, mid intensity is indicated in orange and high intensity is indicated in red.

The total burned area was estimated to be 8342 ha (Figure 5). The burn area was classified into low, medium, and high intensity burn areas (Figure 6). The area burned by low intensity wildfire was estimated at 4728 ha. The mid intensity burn area was estimated to be 3274 ha and lastly, the high intensity fire was estimated at 330 ha. By examining Figure 6, it is apparent that the highest intensity burned areas area were located on the south facing slope of the Hugh Allen drainage. This likely occurred because south-facing slopes receive more intense and prolonged solar radiation. The soil and vegetation on these slopes therefore would contain less moisture and be more susceptible to higher intensity fires. Additionally, much of the higher intensity burns are clustered closer to the valley bottom rather than higher on the slope. This may have occurred as there was more fuel near the bottom of the slope.

It is important to note that the fire intensities were calculated using threshold values determined by me to compare values within the same fire rather than between different wildfires. Therefor, the intensity values for this fire are limited if the goal is to compare the Hugh Allen fire with other fires in terms of intensity. In addition, it is also important to note that many variable such as climatic conditions may have varied between 2016 and 2018 and therefore not all difference values in the digital numbers can be attributed to wildfire intensity with certainty.

In conclusion, this study has successfully estimated the area of the Hugh Allen wildfire and mapped the distribution of wildfire intensity within the burned area.

[Special challenges, if any]

References (if any)

Area restriction rescinded for Hugh Allen Fire south of Valemount. (2018, August 28). The Rocky Mountain Goat. Retrieved December 7, 2020: https://www.therockymountaingoat.com/2018/08/area-restriction-rescinded-for-hugh-allen-fire/

Project Output Summary

Introduction: A brief summary of your project – goals, area and result

Study Area and Data Source

- Study area description
- The data you need for the project (including image dates)
- Comments on image quality (clouds, time of year etc.)

Data methods and analysis

- brief description of methods (could use point form)
- the primary resulting channels from analysis e.g. ratio or classification

Results

- Discussion of results
- Final image display e.g. vectors on image
- Final conclusions of successes or limitation

Images do not need to be super high res. 150 dpi is suggested as enough (.jpg)

You can provide zoom in images if it helps to show detail

submit project as word doc and pdf in case of minor edits (pdf for final presentation)