

To: Dan Austin
From: Will Kwan
Date: February 11, 2025
RE: GISC Lab #4

This memo summarizes the methods, discussions, and results from Lab #4. The analysis focuses on creating a Habitat Suitability Index Model (HSI) for Sasquatch (*Biggus footius-canadianis*) to assess the likelihood of their discovery within the Trout Creek watershed, southwest of Kelowna, adjacent to Okanagan Lake (Figure 1).

Introduction

A GIS analysis was conducted on location-based open data to produce an HSI model for three key habitat characteristics for Sasquatch: forage, modelling availability of food resources essential for sustenance; denning, identifying suitable locations for shelter and protection; and rearing, areas that provide a safe environment for raising offspring. An HSI model is a numerical index that quantifies the capacity of a habitat to support a species based on hypothesized species-habitat relationships (U.S. EPA, 2016). The study defines these relationships from existing research. The results yield a unitless, relative score, where higher values indicate greater habitat suitability and, consequently, a higher likelihood of its presence. This analysis evaluates the Trout Creek watershed's ability to support Sasquatch and quantifies the probability of their presence within the region. These findings contribute to research on the potential discovery of the elusive Sasquatch.

Methods

The BC Data Catalogue provided vector data defining roads, streams, watershed boundaries, municipality boundaries, and Biogeoclimatic Ecosystem Classification (BEC) zones. The Canadian Government's GeoBase provided a raster digital elevation model (DEM) for the study area. As defined by existing research, these data represented the key parameters for calculating HSI models for forage, modelling, and denning. The Trout Creek watershed boundary defined the study area.

To enable raster-based spatial analysis, the vector features were converted to raster by computing their Euclidean distance, allowing for proximity-based analysis. These raster data were then reclassified to a standardized 0–1 scale, where 0 indicated no habitat value, and 1 represented optimal habitat. The values used for reclassification were derived from existing research on Sasquatch habitat suitability, with specific thresholds defined based on habitat features critical to the species' activities.

With habitat-suitability rasters classified on a standardized scale, HSI models for forage, denning, and rearing could be produced. Each model used a weighted average of specific habitat suitability rasters, with the weights determined by the relative importance of each habitat feature to the corresponding Sasquatch activity, as outlined in the existing literature. The forage HSI incorporated BEC Zone, distance from streams, and elevation. The denning HIS considered aspect, slope, distance from road, and distance from town. The rearing HIS included aspect, distance from streams, and slope.

Results

With the analysis complete, the data could be meaningfully represented figuratively and tabularly. Figure 1 illustrates the eight individual input variables used to compute the HSI models and the location of the Trout Creek watershed, which spans approximately 746.45 km² and is located southwest of Kelowna on the western shore of Okanagan Lake. Each input variable is depicted by a standard 0–1 red–green scale, where 0 indicates that an area has no value to Sasquatch habitat and 1 indicates optimal for Sasquatch habitat.

Figure 2 displays the HSI scores for Sasquatch foraging in the Trout Creek watershed. Statistics for the foraging HSI values are outlined in Table 1. The minimum value for the forage HSI was determined to be 0.4, and the maximum was 0.953. The highest values were typically found in the central regions of the watershed, though they remain relatively high throughout the area.

Table 1.
Forage HSI Statistics

Max	Min	Mean	Median	Std. Dev.
0.953	0.4	0.719	0.71	0.09

Figure 3 displays the HSI scores for Sasquatch denning in the Trout Creek watershed. Statistics for the denning HSI values are outlined in Table 2. The minimum value for the denning HSI was determined to be 0, and the maximum was 0.965. High values for denning HSI are predominantly found in areas that face a south-southwest-west direction. The lowest scores are concentrated in the southwestern portion of the watershed.

Table 2.
Denning HSI Statistics

Max	Min	Mean	Median	Std. Dev.
0.965	0	0.501	0.461	0.184

Figure 4 displays the HSI scores for Sasquatch rearing in the Trout Creek watershed. Statistics for the rearing HSI values are outlined in Table 3. The minimum value for the rearing HSI was determined to be 0.207, and the maximum was 1. High rearing scores are predominantly found in areas that face a south direction.

Table 3.
Rearing HSI Statistics

Max	Min	Mean	Median	Std. Dev.
1	0.206	0.672	0.673	0.171

Conclusions

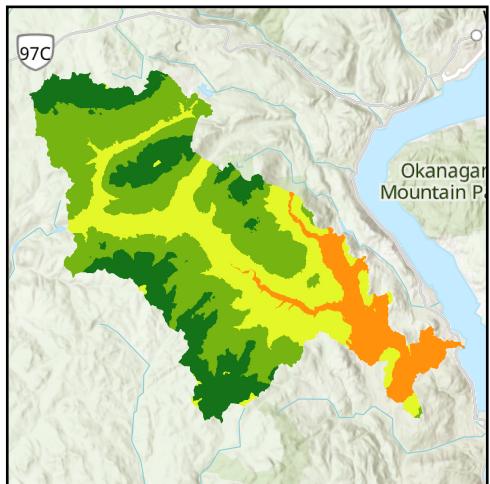
Higher scores indicate a better habitat and, thus, a higher likelihood of finding Sasquatch. Therefore, Figures 1, 2, and 3 outline the best chances of finding Sasquatch during each activity (forage, denning, and rearing).

References

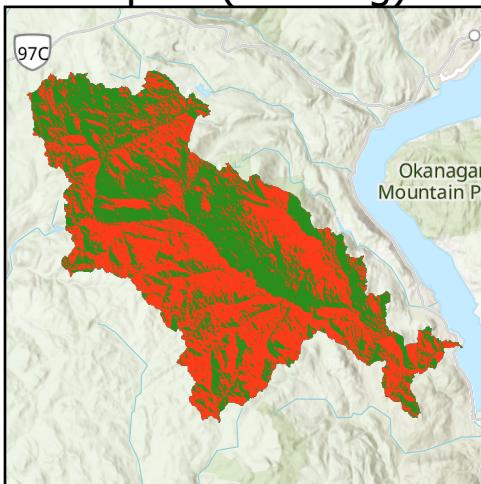
- United States Environmental Protection Agency. (2016). *Habitat suitability index (HSI)*. U.S. Environmental Protection Agency.
<https://archive.epa.gov/aed/html/research/scallop/web/html/hsi.html>

Figure 1: HSI Input Variables

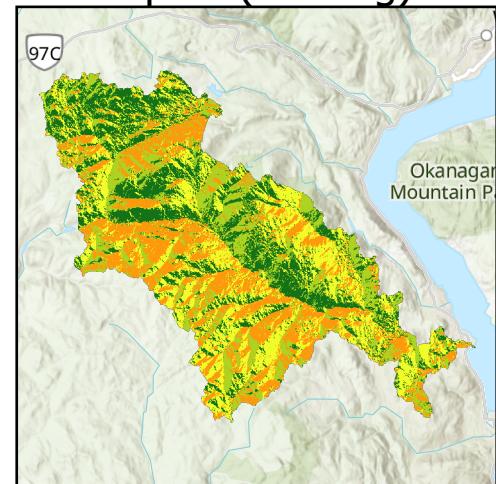
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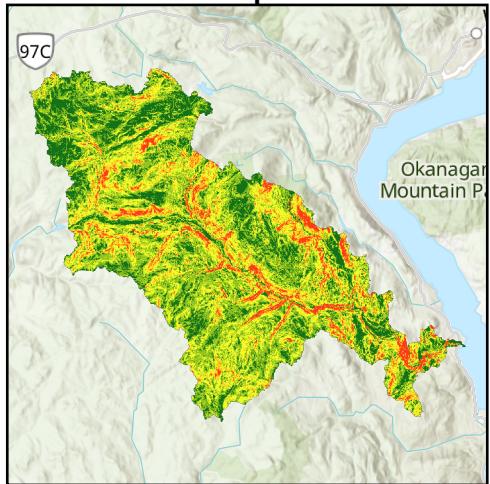
Aspect (Denning)



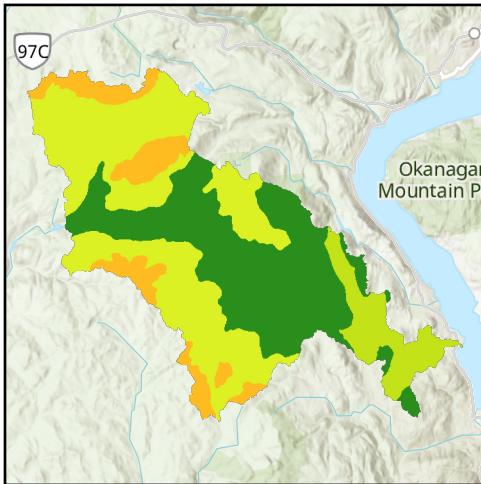
Aspect (Rearing)



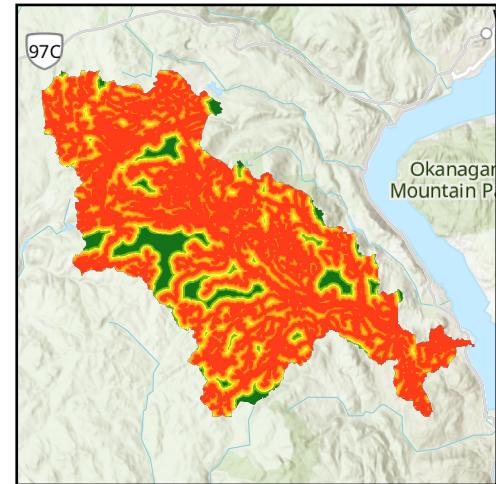
Slope



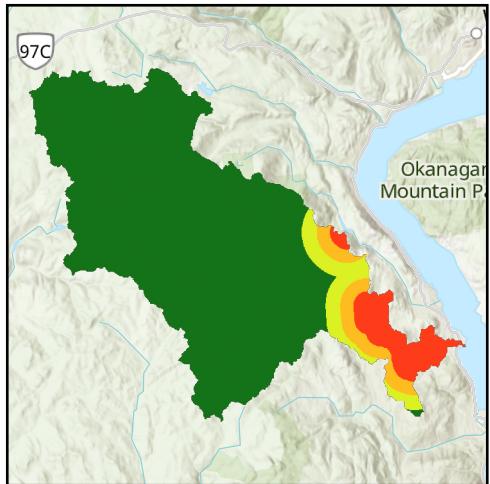
BEC Zone



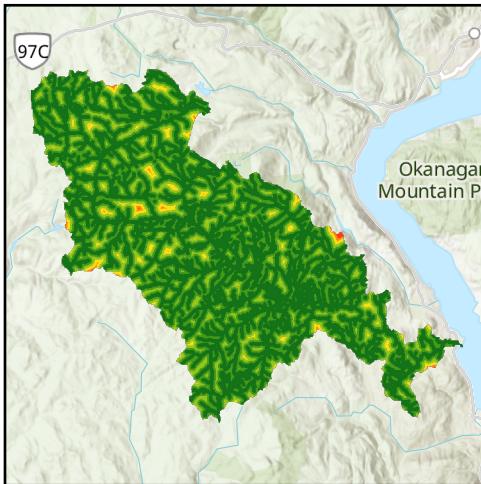
Distance from Road



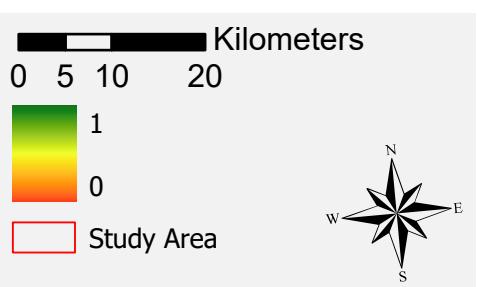
Distance from Town



Distance from Stream



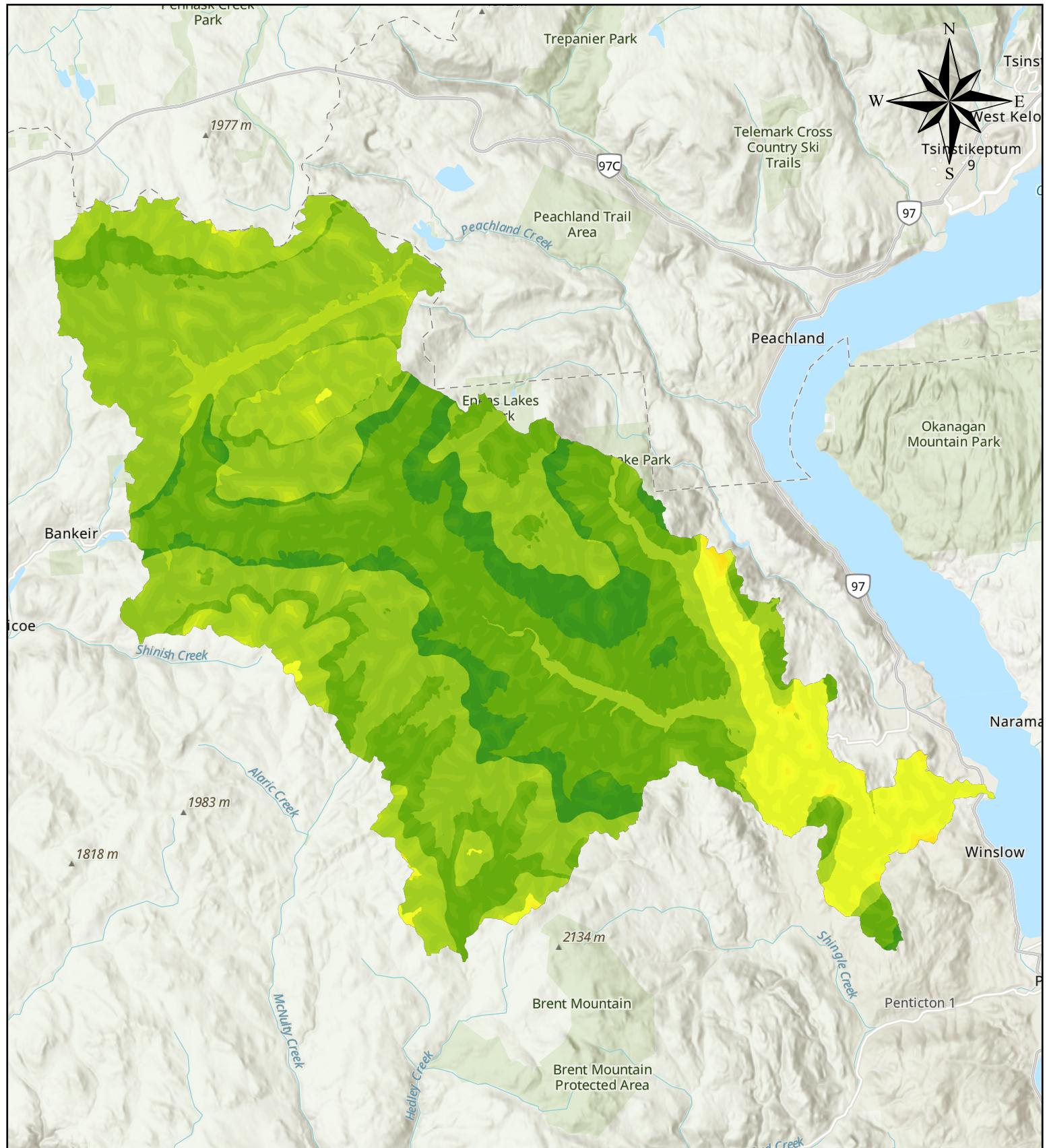
Study Location



Kilometers
0 15 30

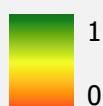
Projection: NAD 1983 Albers
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Figure 2: HSI for Forage



■ Kilometers

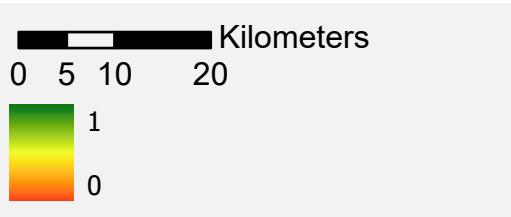
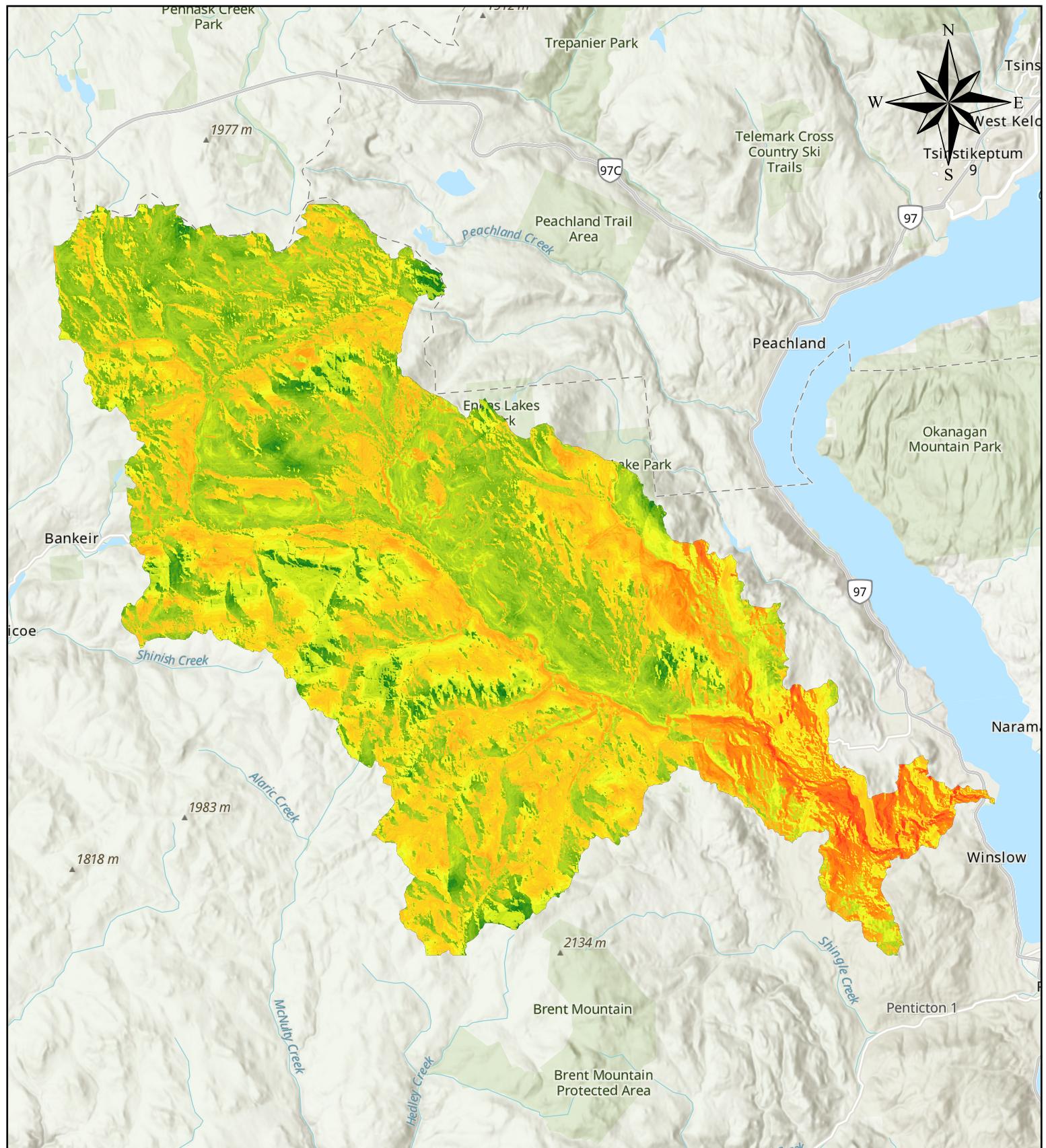
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Projection: NAD 1983 Albers

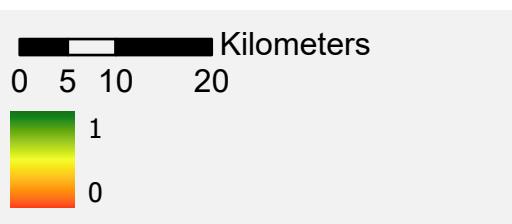
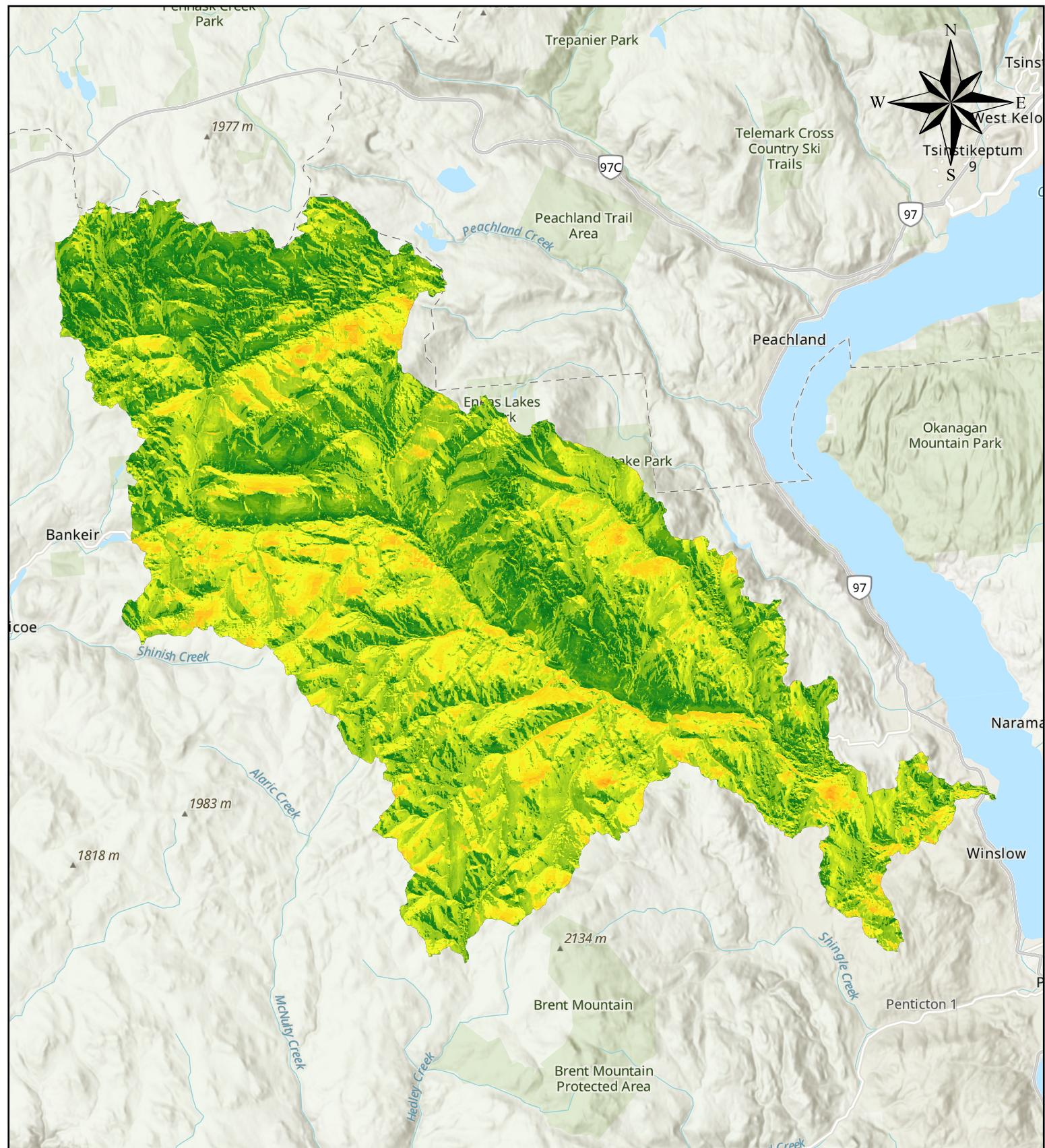
Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, USDA, NRCan, Parks Canada, Esri, NASA, NGA, USGS

Figure 3: HSI for Denning



Projection: NAD 1983 Albers
Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, USDA, NRCan, Parks Canada, Esri, NASA, NGA, USGS

Figure 4: HSI for Rearing



Projection: NAD 1983 Albers
Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, USDA, NRCan, Parks Canada, Esri, NASA, NGA, USGS