HABITAT SUITABILITY ANALYSIS FOR WOOD BISON AISHIHIK HERD, YUKON

Introduction

Wood bison are an important species to both northern culture and ecosystem. Their population began to decline in the 19th century and were extirpated in the Yukon in the 20th century. The Aishihik Wood Bison herd was reintroduced as part of a recovery plan initiated by the Yukon Government. 170 bison were relocated in the 1900's at the Nisling Valley River, but throughout time these bison migrated to an southwards towards Aishihik Lake to establish the current day herd core range. The goal of this analysis is to identify highly suitable, and unsuitable habitat within this range. The results will be used to identify areas for herd control and/or form that base criteria for future analysis of the surrounding area to identify potential future reintroduction zones.

Data

Human Data Layers

Natural Resource Activities

Roads

First Nations Settlements

Physical Data Layers

Fire History

Lakes and Rivers

Slope Aspect

Slope Degree

Landcover
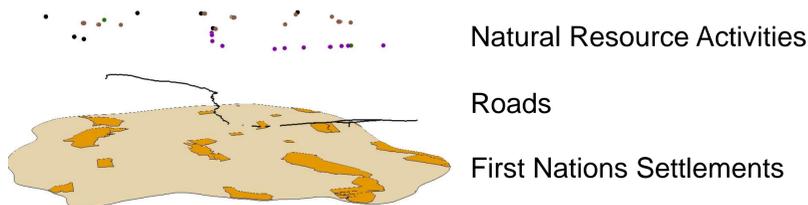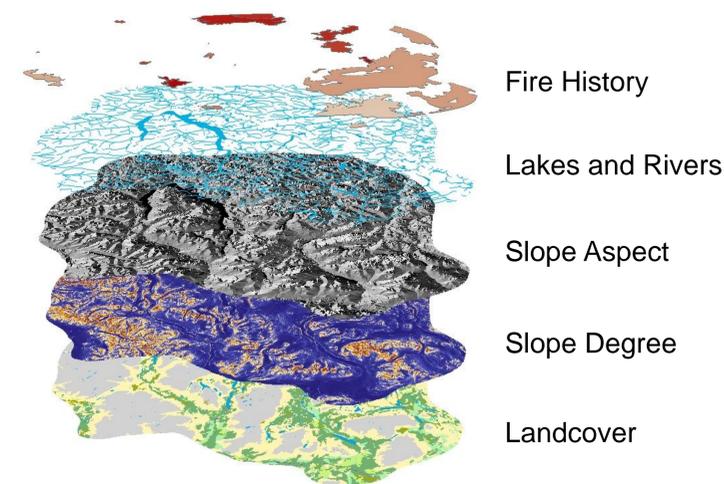
Data Sources

Yukon, G. o. (2012, May). *[Data File]*. Retrieved from https://mapservices.gov.yk.ca/GeoYukon/
Yukon, G. o. (2018, October). *Yukon DEM [Data File]*. Retrieved from https:..yukon.ca/nen/map-gis-data-envrionmentallyyukon-digital-elevation-model

Methods

Multi-Criteria Decision Analysis

Criteria	Sub-criteria	Rank	Group Weight	Sub-weight
Physical/ Environmental Conditions	Slope Distance to water Land Cover Aspect Fire History	1	70	60 40 60 20 30
Human Influence	Roads Natural Resource activities First Nation Settlements	2	30	20 30 10

MCDA was used to determine the weights of each criteria and sub criteria. A literature review was used to determine these variables and their weights. Data was retrieved from the Government of Yukon GeoYukon website. Preprocessing steps included clipping to the Aishihik herd boundary, projecting each dataset to NAD 1983 Yukon Albers. All human influence variables were buffered at different rates determined by a literature review, then converted to rasters defined by the DEM's cell size. The physical/environmental conditions were converted from polygon to rasters, and then buffered at different rates determined by the literature review. The DEM layer was processed into a slope and aspect layer. All layers were reclassified on a scale of 1 to 5, as determined by the literature. Finally, a raster calculation was used to create the suitability analysis model using the following expression:

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( (((("Recl_Road" * 0.33 + "Recl_HumanActivity" * 0.5 + "Recl_FirstNation" * 0.17) * 3) * 0.3) +
(("Recl_slope" * 0.285 + "Recl_waterBuf" * 0.19 + "Recl_landcover" * 0.285 + "Recl_Aspect" * 0.1 +
"Recl_FireHistory" * 0.14) * 5) * 0.7 )* 2
```

GIS Model
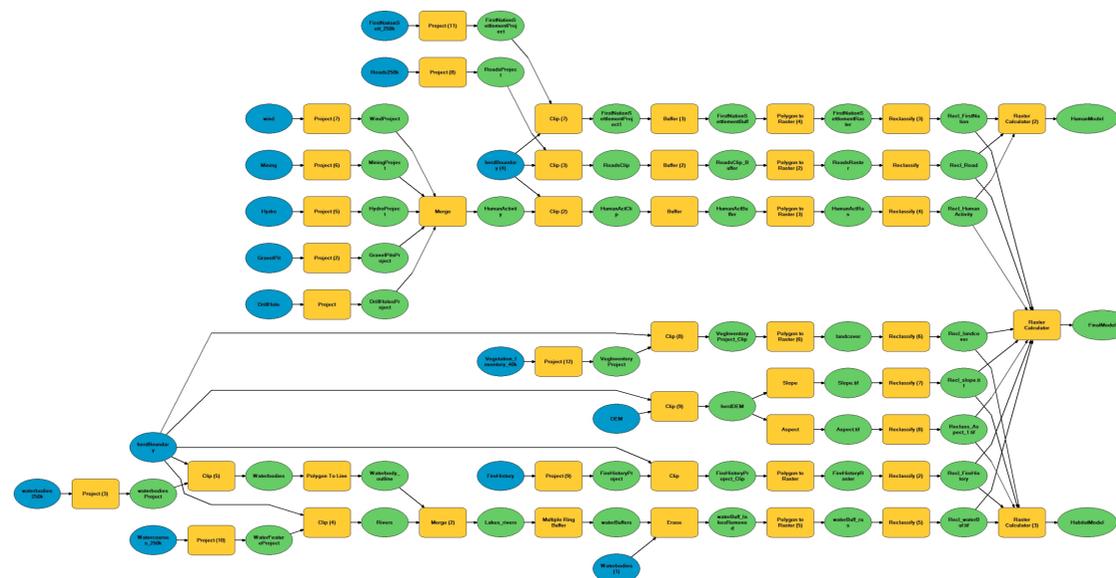
Results

Habitat Suitability Analysis for the Aishihik Bison Herd Yukon, Canada

Habitat Suitability

Suitability Level
High
Low

0 5 10 20 30 40 Kilometers
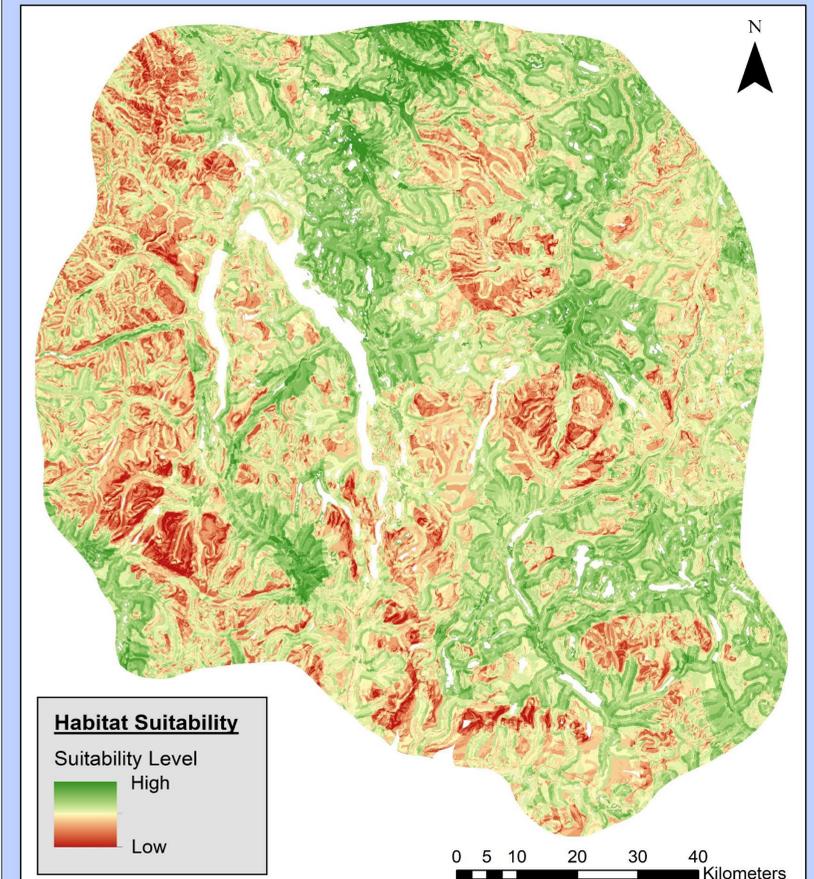
This model measures the habitat suitability of the Aishihik Bison Herd located in Southwestern Yukon in Canada. This weighted model considers two major influences; environmental/physical properties and human activity. The environmental/physical factors considered in this model include landcover, slope degree, slope aspect, distance to water sources (rivers and lakes), and fire history. The human activity factors considered include, First Nations settlements, distance to roadways, and natural resource activities (mining, drill holes, gravel pits, wind energy, hydro energy).

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Projection: NAD 1983 Yukon Albers
Source: Government of Yukon. (2012).
Government of Yukon [Data Files].
Retrieved from
https://mapservices.yk.gov.ca/GeoYukon

This analysis shows how habitat suitability analysis can be used for Wood Bison in Yukon Canada to determine highly suitable and unsuitable habitat in the herd's range. This analysis found highly suitable areas to be wetland, shrub and woodland cover, with flat terrain, and recently burned areas. Human activities were found to increase the level of habitat fragmentation. The habitat suitability analysis created can be used to aid in population control, conservation, reintroduction or by other organizations to perform similar analysis for Wood Bison in Canada.

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