Conserving Woodland Caribou Habitat: A Pilot Study of the Churchill River Upland Ecoregion of Northern Saskatchewan, Canada

Background
This pilot, in the Churchill River Upland Ecoregion of Northern Saskatchewan, explores the feasibility of modelling anthropogenic-related encroachment upon preferred woodland caribou habitat. The woodland caribou, which reside within the boreal forested region of northern Canada, require large contiguous tracts of land and are currently classified as threatened under the Species at Risk Act.1 Anthropogenic disturbance has degraded the quality and has led to the fragmentation of caribou habitat. Modeling encroachment upon woodland caribou habitat from anthropogenic disturbances can provide guidance for the development of strategies to connect fragmented habitat and recover degraded habitat. For example, this model could provide guidance on potentially suitable locations to create forested corridors to connect areas of preferred habitat. The aim of this project is to develop a GIS model that can be replicated throughout the boreal forested regions of Canada, in order to examine anthropogenic encroachment on preferred woodland caribou habitat.

Methods

Prepared woodland caribou habitat is characterized in this model as coniferous forested, hilly areas with northward facing slopes, which are far from anthropogenic disturbances. To create the composite evaluation map (composed of 100m cells), 1 used anthropogenic disturbance data (2008-2010; 1:50,000), landcover data (1996; 1:1 million), and Canadian digital elevation data (2016; 0.75 arcseconds). Sites within the Churchill River Upland Ecoregion of Northern Saskatchewan were ranked from 0 to 3, with a score of 0 being ‘unsuitable’ for woodland caribou habitat, a score of 2 being ‘possibly ok’, and a score of 3 being ‘preferred habitat’, as defined by the parameters of this model (i.e. slope, aspect, landcover, distance from linear and polygonal anthropogenic disturbances).

Suitability Factors

Slopes within woodland caribou habitat should face northwards to support lichen growth. Northward facing slopes provide favorable conditions for lichen growth, the preferred food source of woodland caribou. Slope data were used to examine aspect. Slopes facing N, NE, and NW were scored as ‘preferred habitat’, slopes facing S and flat surfaces were scored as ‘poor’. In addition, slopes facing W, S, and SE were scored as ‘possibly ok’.

Woodland caribou prefer coniferous forests to hardwood. This model scored 4,147 hectares of land within the forested area as ‘poor’ and 42,808 hectares of ‘possibly ok’. The Pink Lake Ecological Reserve is an example of heavily disturbed land. According to this model, anthropogenic disturbance along the CanAm Highway has fragmented woodland caribou habitat. This model scored 2,147 hectares of land within the circled area as ‘poor’ and 42,808 hectares of ‘possibly ok’.

Conclusions
This model estimates that there are 186,658 ha of preferred habitat within the Churchill River Upland Ecoregion of Saskatchewan. Additionally, this model estimates that areas of preferred habitat are fragmented due to anthropogenic encroachment. One of the main limitations of this model was the lack of more recent landcover and anthropogenic disturbance data for northern Saskatchewan. With more recent landcover data, I would expect to see a decrease in the estimated coniferous forested area since 1996, an increase in area subject to anthropogenic disturbance since 2010, and thus a decrease in the area of preferred habitat. Additionally, with the granularity of 1:50,000, the anthropogenic disturbance data likely missed relatively small disturbances such as hunting huts and small ice roads that may be used during the winters. This model could be further improved by taking into account that different disturbance types may be further reaching than others, and by more accurately defining the size of the disturbed areas for each different disturbance type. Furthermore, this model could take into account the susceptibility of different sites to forest fires, which can temporarily degrade and fragment woodland caribou habitat.

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Image from: https://www.panow.com/article/6016/woodland_caribou_habitat.png