

Webequie Supply Road Project

Webequie First Nation

January 9, 2026

AtkinsRéalis Ref: 661910

APPENDIX U: GHD CATEGORY 2 AND 3 MAPPING REPORT FOR NET EFFECTS ASSESSMENT IN OZHISK AND MISSISA CARIBOU RANGES (2024)

AtkinsRéalis



WSR
WEBEQUIE
SUPPLY ROAD



GHD Category 2 and 3 Mapping Report for Net Effects Assessment in Ozhiski and Missisa Caribou Ranges (2024)

FERIT Environmental Consulting (Jan 30, 2024)

<https://www.ferit.ca>



Background

Under the General Habitat Description, Category 2 habitat represents seasonal ranges for caribou, while category 3 is the remaining habitat that may still be used, but has lower value to caribou ([General habitat description for the Forest-dwelling Woodland Caribou | ontario.ca](#)). MECP has taken an RSPF approach to mapping category 2 habitat by mapping each of the 4 seasonal ranges, and is briefly described in methods for State of the Woodland Caribou Resource reports ([State of the Woodland Caribou Resource Report: Part 3 | ontario.ca](#)). More detail is available in Hornseth and Rempel (2016) and Rempel and Hornseth (2017). This method maps potential habitat value based on modelling associations of observed caribou use with land cover, linear features, and other environmental variables.

Methods

The Category 2 (RSPF) model was based on 7 classes from the Landsat based Provincial Forest Classification (PLC) plus esker lines, mapped forest fires, and anthropogenic linear features (Table 1). Maps of the variables are provided in Appendix - Cat 2 Input Variable Maps, along with PLC class definitions. Calculations are conducted in the specialized GIS program, Landscape Scripting

Language (LSL) (Kushneriuk and Rempel 2011), which allows for multiple scale modeling using spatial averaging of hexagons. For caribou Category 2 maps, an intersection of 3-ha hexagons with landscape variables is conducted first, and then spatial averages generated at the 5,000-ha scale are used for the RSPF analysis. This scale was used because it resulted in the highest performance relative to all other scales that were assessed (Hornseth and Rempel 2016).

Table 1. Variables used in the Category 2 RSPF model.

Variable	Source	Calculation
Dense Deciduous	PLC	Proportion within hexagon
Dense Mixed Forest	PLC	Proportion within hexagon
Dense Conifer	PLC	Proportion within hexagon
Sparse Treed	PLC	Proportion within hexagon
Treed Peatland	PLC	Proportion within hexagon
Open Peatland	PLC	Proportion within hexagon
Water	PLC	Proportion within hexagon
Natural Disturbance	Disturbance mapping	Majority with hexagon
Eskers lines	Topographic map	Density (m/ha)
Linear features – roads, railways, and transmission lines	Anthropogenic disturbance mapping	Density (m/ha)

Forest harvest, aging, and succession change the landcover over time, especially forest cover. Wetlands and other variables remain stable. Of the original PLC model variables, deciduous, mixed forest, and conifer in the PLC were updated in LSL by overlaying disturbance layers and reassigning existing PLC classes to the appropriate disturbance classes.

Within the WSR area, two groups of disturbance under current condition were processed in LSL to update the PLC 2000 map: burns and infrastructure. There was no forest harvest, so this layer was not relevant for the WSR area. The burn layer was from LIO, and disturbance age calculated as current year – burn year. A settlement layer was created from the LIO settlements layer and MNM mines layer by creating a 1 km buffer around existing mines and settlements. If a 3-ha hexagon intersected a burn or harvest disturbance ≤ 40 years or a settlement, and proportion was $> 10\%$ of the hexagon, then mature forest in the hexagon was reclassified to either PLC classes 7 (Burn), 8 (Harvest), or 3 (Settlement). In addition, construction of roads, hydro lines, communication lines and pipelines also remove mature forest. To model this the PLC landcover was updated in LSL to change any mature forest classes in the 3.1 ha hexagon cell (100 m radius) that intersected an anthropogenic linear feature to the Settlement class. The collective effect of this disturbance on the PLC 2000 landcover is shown output as the original PLC updated landcover maps. When net effects are being considered, future condition, proposed mine infrastructure, including project footprint and laydown areas, were added to the appropriate layers, and processed in LSL as a separate scenario.

Linear features have an additional effect on caribou in that they facilitate movement and effectiveness of predators. Vector lines from LIO for roads, railways, and hydro-lines were imported into LSL, and density of these features calculated.

Results

GHD category 2 and 3 regional range caribou habitat is based on the selective use of landscape features across all 4 seasons. The RSPF models probability of use for each season, and a threshold value for the continuous probability of use is determined above which the habitat is categorized as high use, and therefore contributes to category 2 habitat. A location that has predicted high use for any season is labelled category 2, otherwise in is labelled category 3. The report output includes season specific maps for probability of use, high- and low-use threshold maps, and GHD category 2 and 3 maps. In addition to the category 2 modelling maps, a few of the critical model variable input maps are included, but the full set of variable maps are in the Appendix. Summarized values for across the landscape are provided in Table 2 for both current condition and future condition. Future condition includes disturbance resulting from the project footprint of the proposed road, along with laydown areas and aggregate extraction sites.

Table 2. Average probability of use of GHD Category 2 for the Ozhiski and Missisa Caribou Ranges under current condition (2024) and future condition resulting from disturbance related to project footprint, aggregate extraction sites, and laydown areas.

Variable	Range	Season	Current Condition	Future Condition	% Change
Category 2	Ozhiski	All Seasons	0.688	0.688	0.0%
Prob High Use	Ozhiski	Spring	0.271	0.271	0.0%
Prob High Use	Ozhiski	Summer	0.403	0.403	0.0%
Prob High Use	Ozhiski	Fall	0.483	0.483	0.0%
Prob High Use	Ozhiski	Winter	0.330	0.330	0.0%
Prob of Use	Ozhiski	Spring	0.110	0.110	0.0%
Prob of Use	Ozhiski	Summer	0.090	0.090	0.0%
Prob of Use	Ozhiski	Fall	0.169	0.169	0.0%
Prob of Use	Ozhiski	Winter	0.102	0.102	0.0%
Category 2	Missisa	All Seasons	0.862	0.847	1.7%
Prob High Use	Missisa	Spring	0.719	0.696	3.3%
Prob High Use	Missisa	Summer	0.502	0.488	2.9%
Prob High Use	Missisa	Fall	0.588	0.574	2.5%
Prob High Use	Missisa	Winter	0.281	0.276	1.8%
Prob of Use	Missisa	Spring	0.153	0.149	2.6%
Prob of Use	Missisa	Summer	0.193	0.187	3.0%
Prob of Use	Missisa	Fall	0.034	0.033	1.3%
Prob of Use	Missisa	Winter	0.163	0.159	2.0%

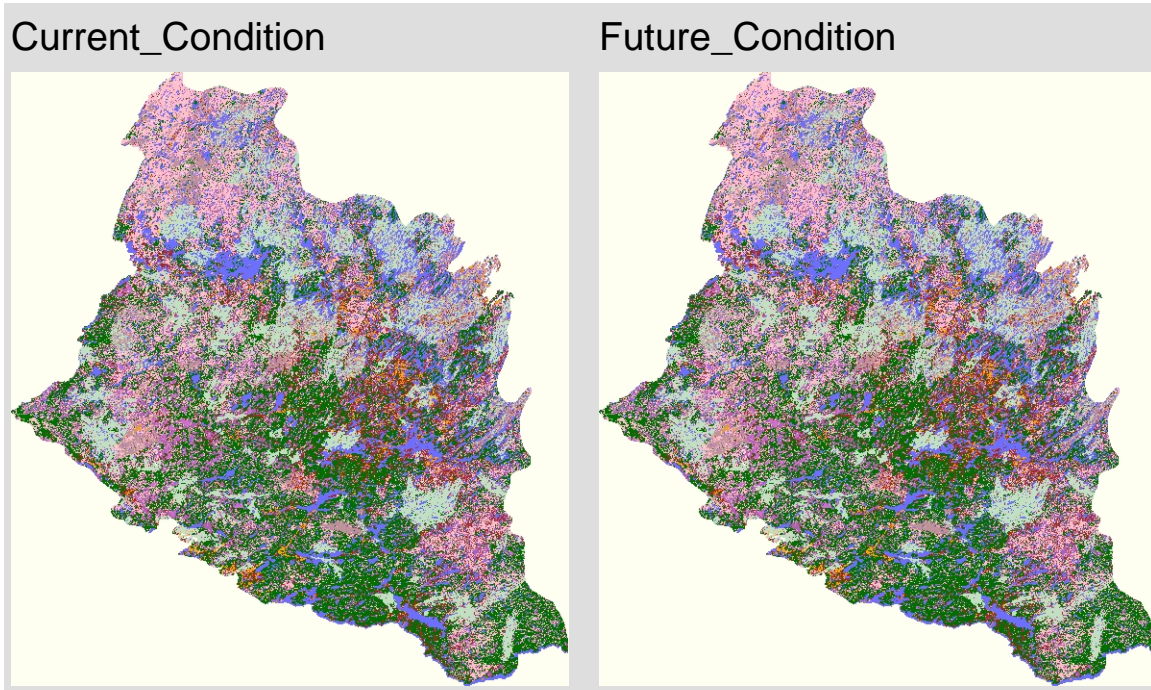
References

1. <https://www.ontario.ca/page/general-habitat-description-forest-dwelling-woodland-caribou>
2. <https://www.ontario.ca/page/state-woodland-caribou-resource-report-part-3>
3. Kushneriuk, R. S., and R. S. Rempel. 2011. LSL- Landscape Scripting Language Ontario Ministry of Natural Resources, Centre for Northern Forest Ecosystem Research, Thunder Bay, Ontario.
4. Hornseth, M. L., and R. S. Rempel. 2016. Seasonal resource selection of woodland caribou (*Rangifer tarandus caribou*) across a gradient of anthropogenic disturbance. *Canadian Journal of Zoology* 94:79-93. Kushneriuk, R. S., and R. S.
5. Rempel, R. and M. Hornseth. 2018. Range-specific seasonal resource selection probability functions for 13 caribou ranges in Northern Ontario. Ontario Ministry of Natural Resources and Forestry

3.1

Category 2 Mapping for Ozhiski Range

Original Land Cover Class (2000) within the Ozhiski Caribou Range

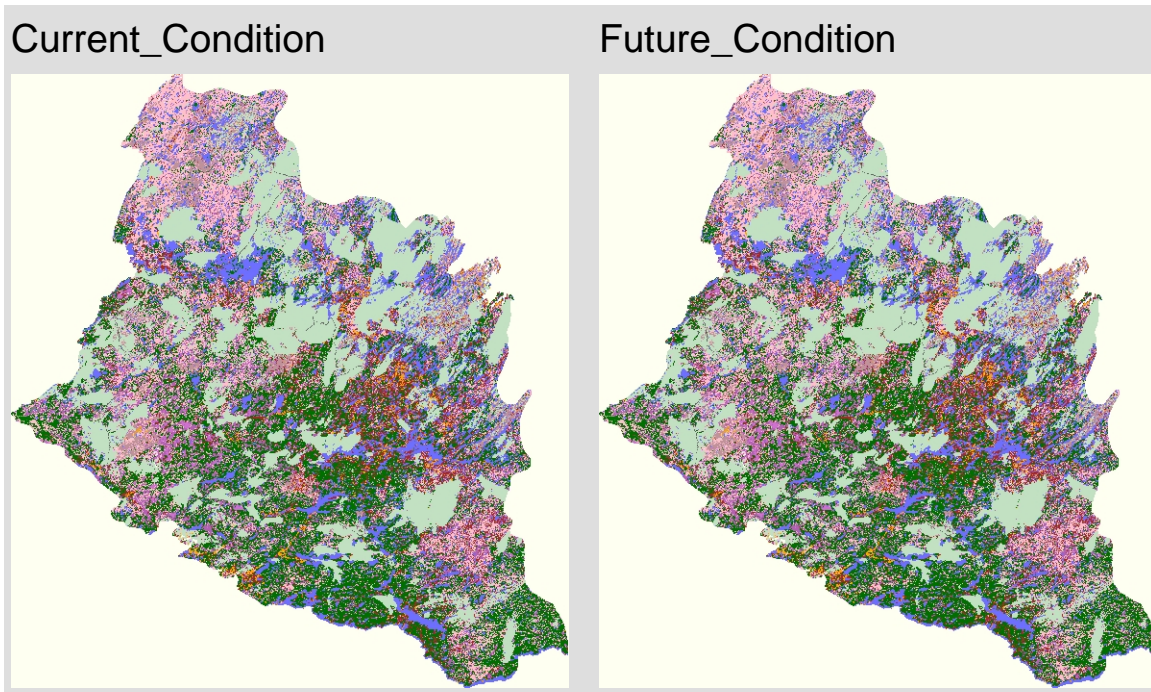


Land Class

- WAT
- STLM
- NFOR
- CUT
- BURN
- F_RP
- F_SP
- DEC
- MIX
- CON
- MSH
- SWP
- FBO
- FBT
- TDR
- AGR
- OTH

3.1 Category 2 Mapping for Ozhiski Range

Updated Land Cover Class within the Ozhiski Caribou Range



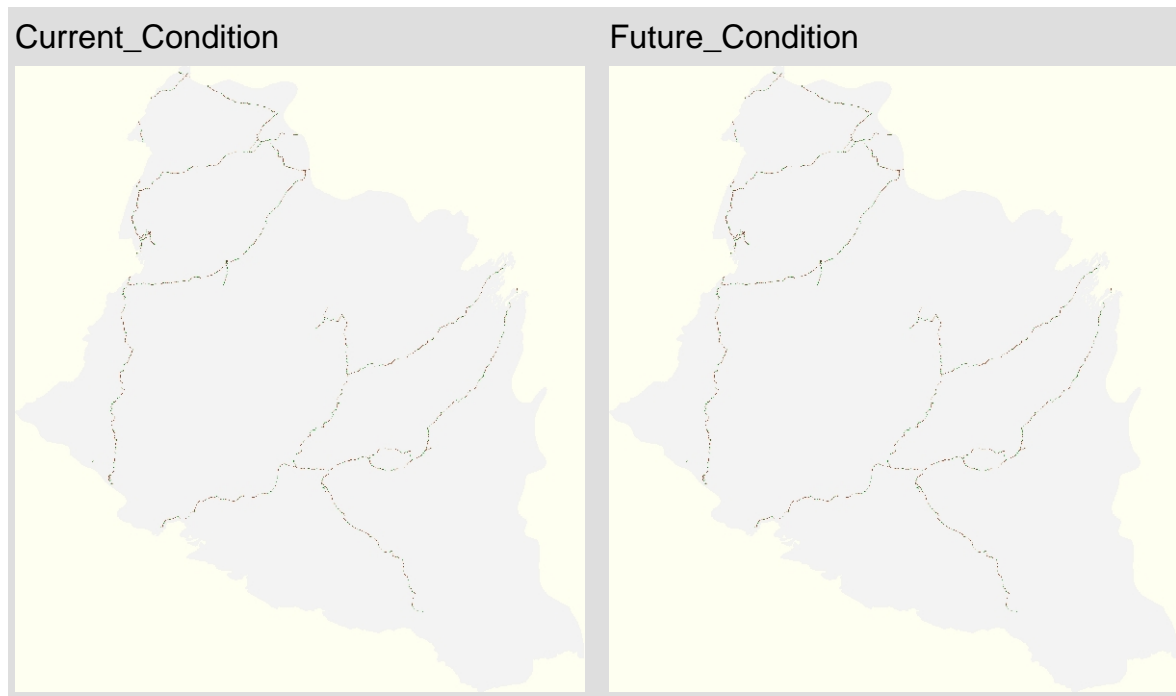
Land Class

- WAT
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- NFOR
- CUT
- BURN
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- MIX
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- FBT
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- AGR
- OTH

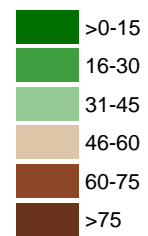
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Category 2 Mapping for Ozhiski Range

Roads within the Ozhiski Caribou Range



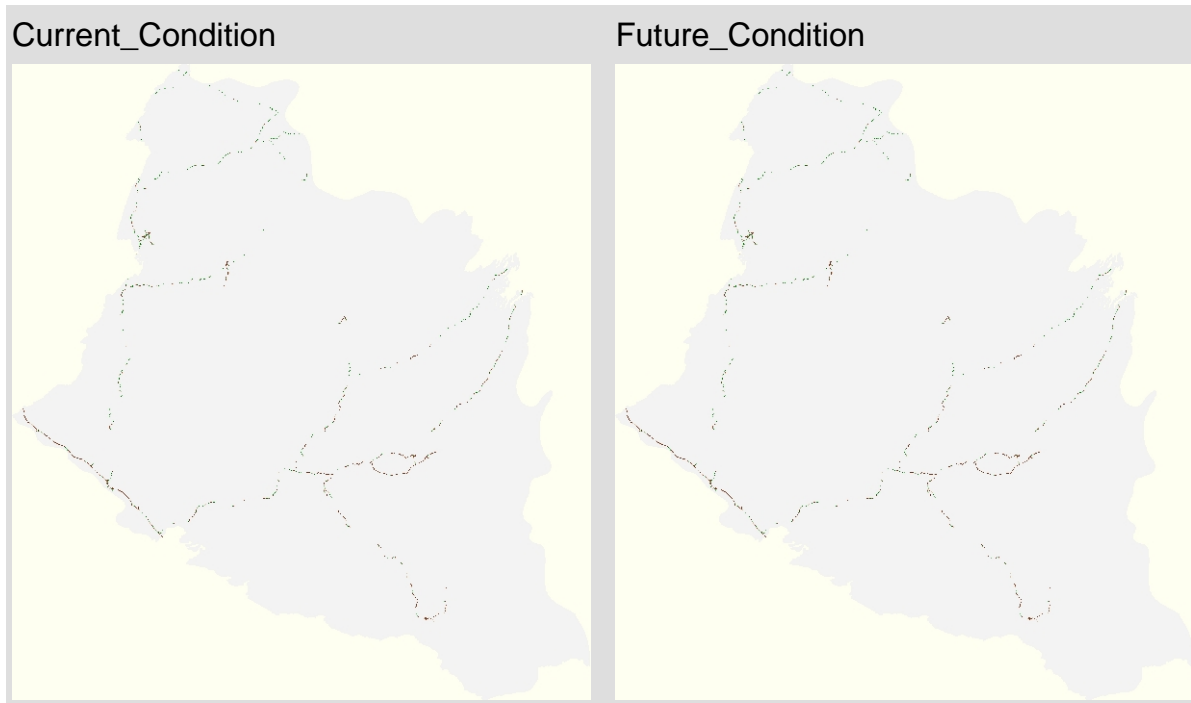
Density m/ha



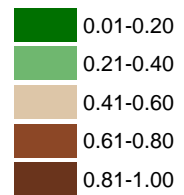
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Category 2 Mapping for Ozhiski Range

Settlements and Infrastructure (PLC Updated) within the Ozhiski Caribou Range



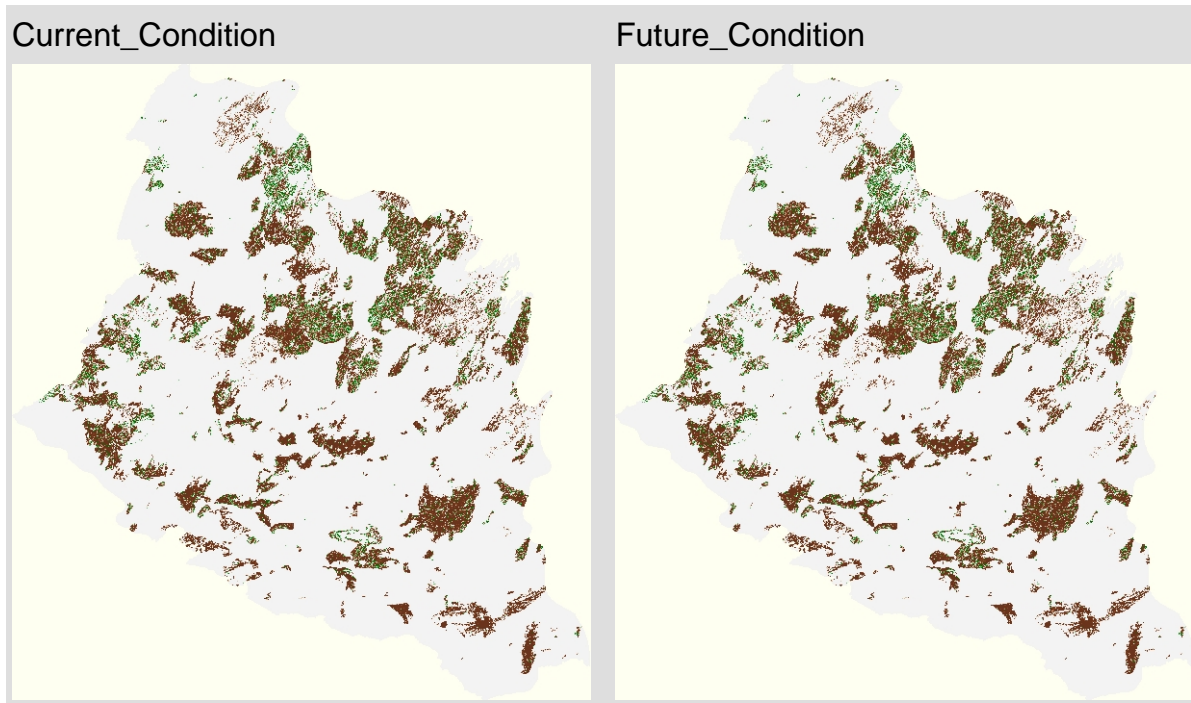
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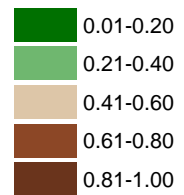
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Category 2 Mapping for Ozhiski Range

Natural Disturbance (PLC Updated) within the Ozhiski Caribou Range



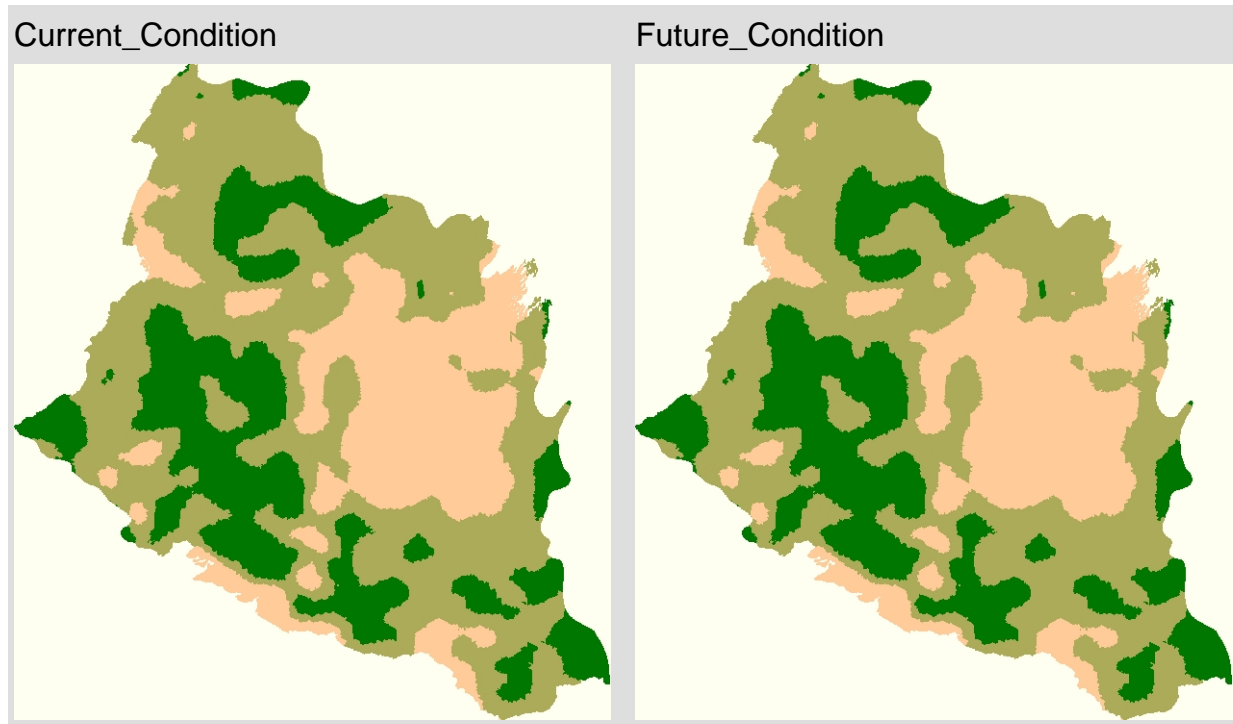
Proportion



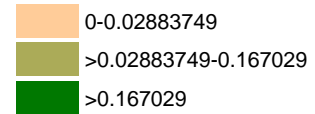
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Category 2 Mapping for Ozhiski Range

Probability of Spring Use within the Ozhiski Caribou Range



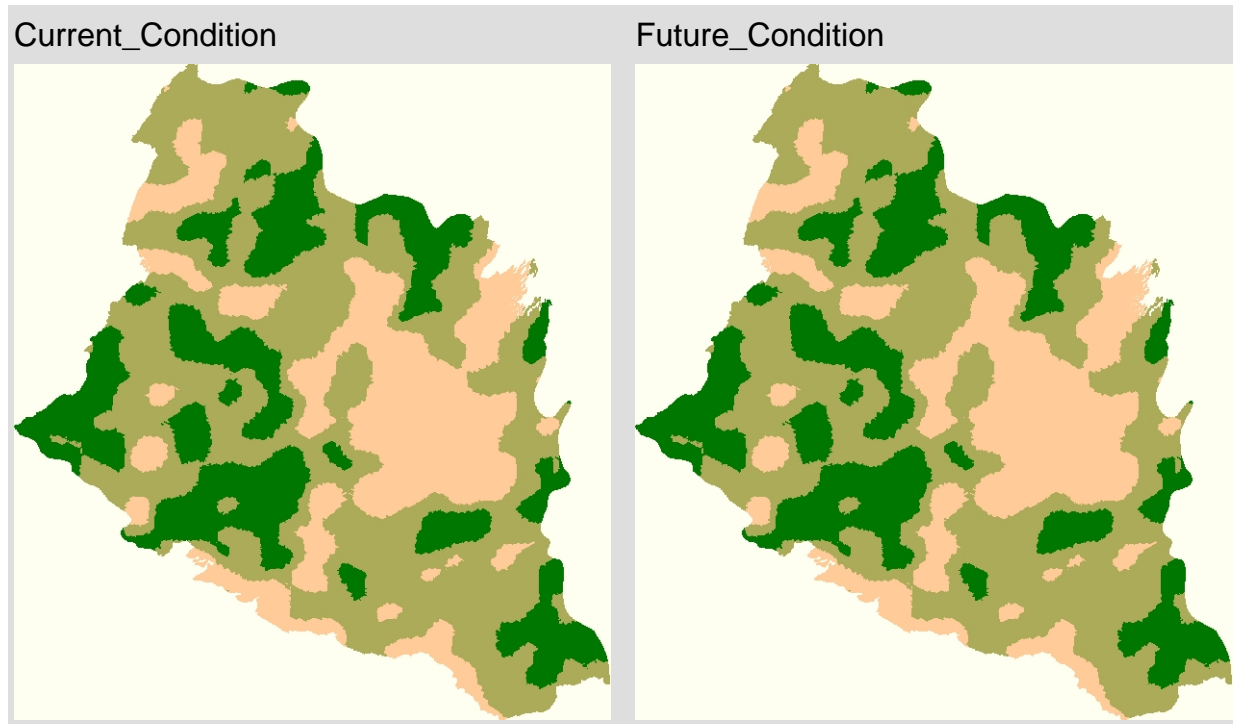
Probability of Spring Use



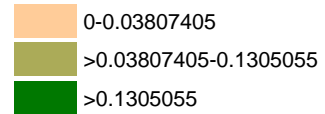
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Category 2 Mapping for Ozhiski Range

Probability of Summer Use within the Ozhiski Caribou Range



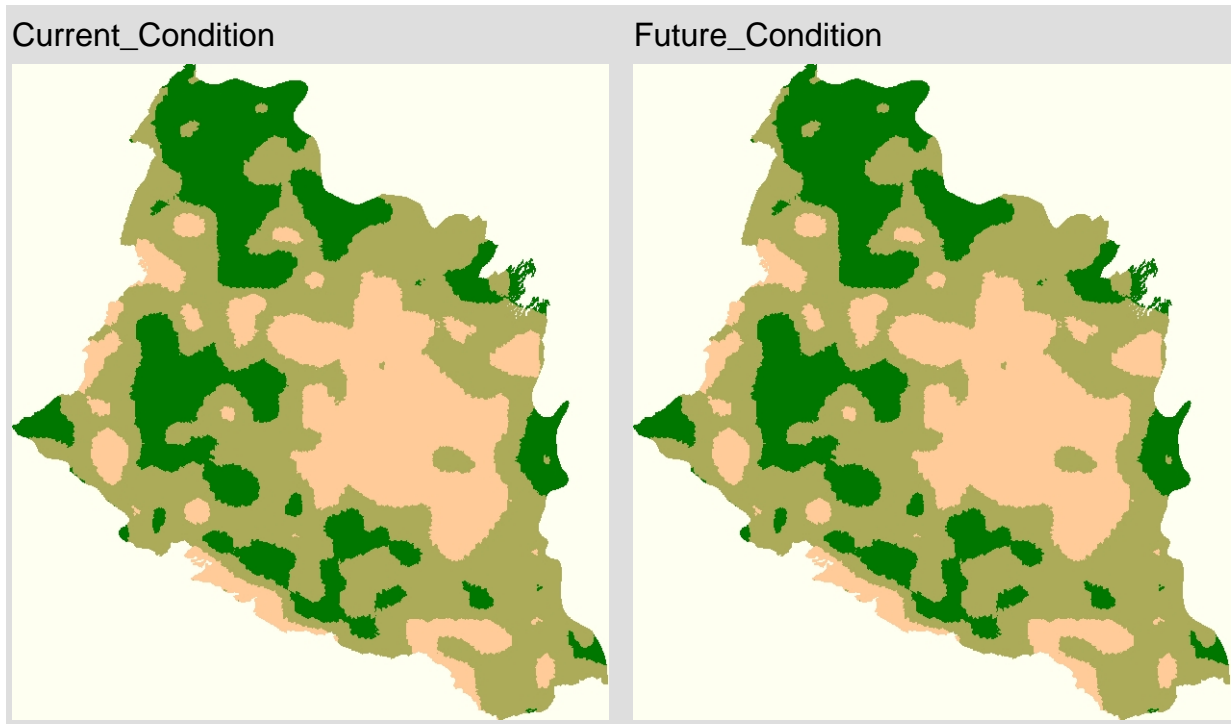
Probability of Summer Use



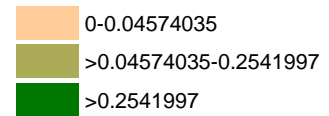
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Category 2 Mapping for Ozhiski Range

Probability of Fall Use within the Ozhiski Caribou Range



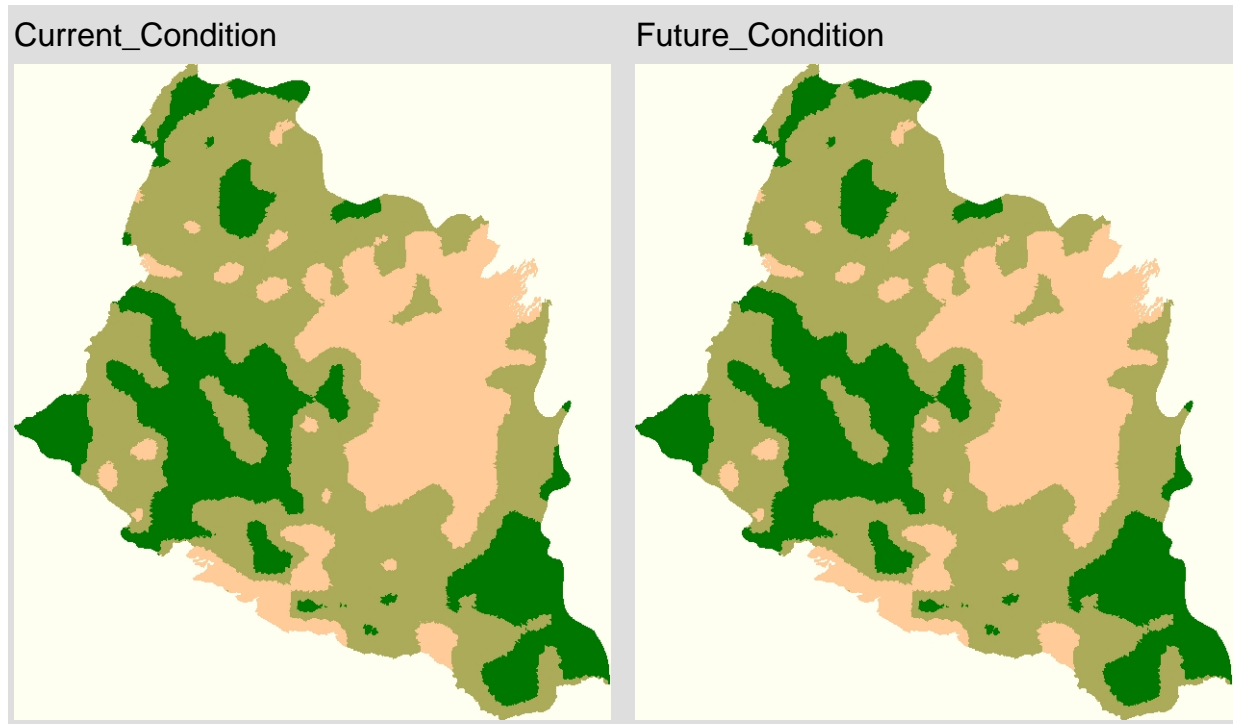
Probability of Fall Use



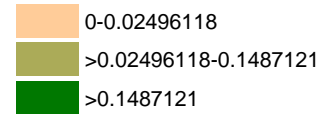
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Category 2 Mapping for Ozhiski Range

Probability of Winter Use within the Ozhiski Caribou Range



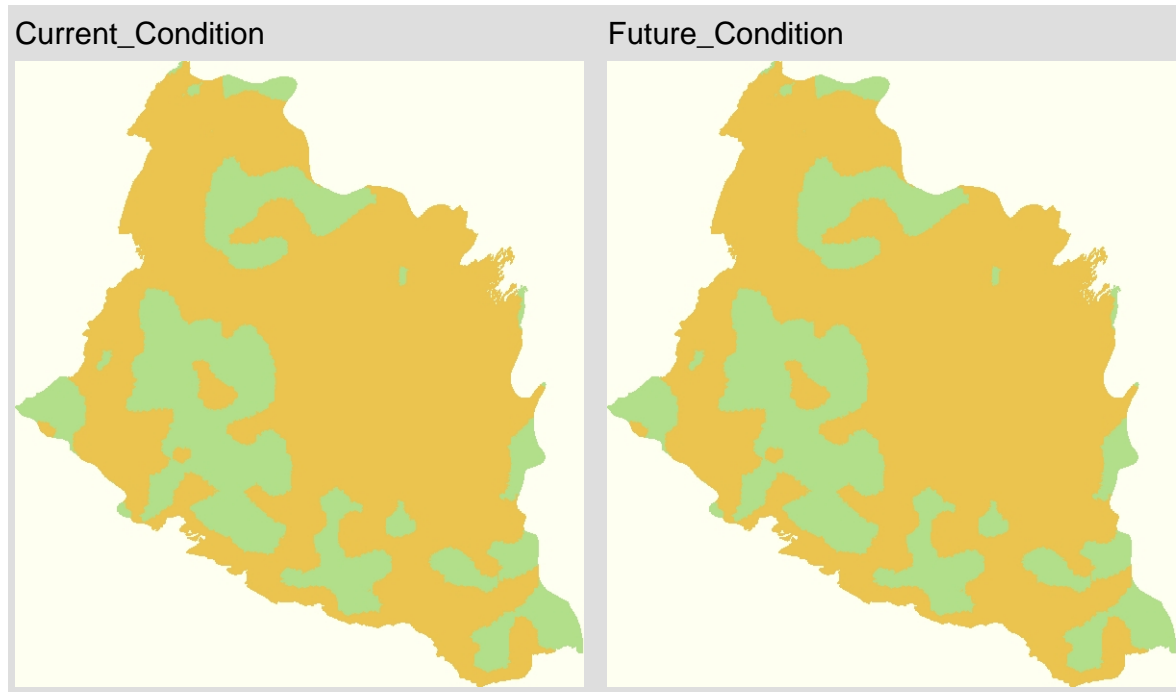
Probability of Winter Use



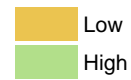
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Category 2 Mapping for Ozhiski Range

Categorized: Spring Use within the Ozhiski Caribou Range



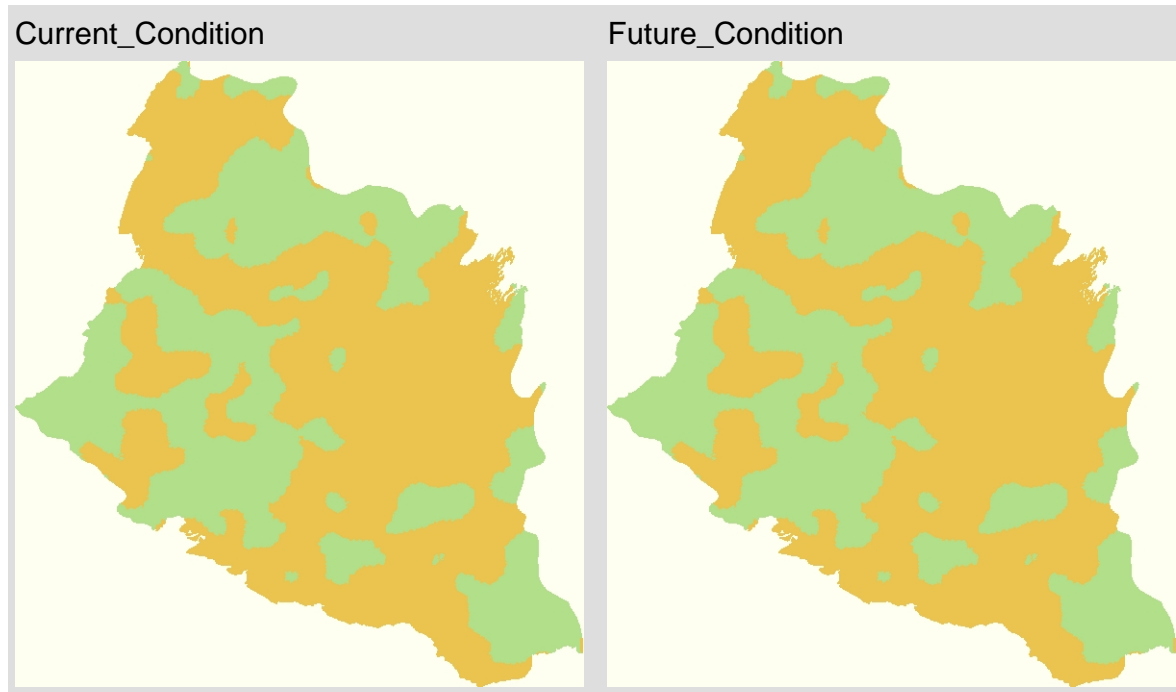
Prob. Class Spring Use



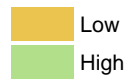
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Category 2 Mapping for Ozhiski Range

Categorized: Summer Use within the Ozhiski Caribou Range



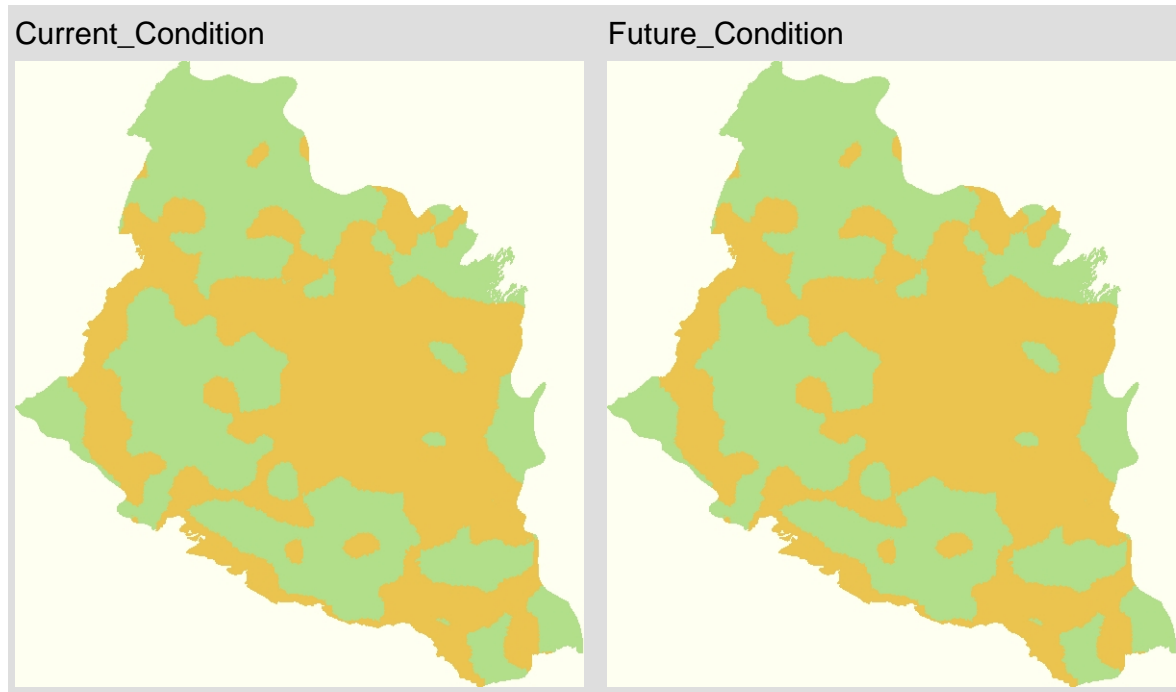
Prob. Class Summer Use



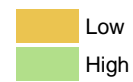
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Category 2 Mapping for Ozhiski Range

Categorized: Fall Use within the Ozhiski Caribou Range



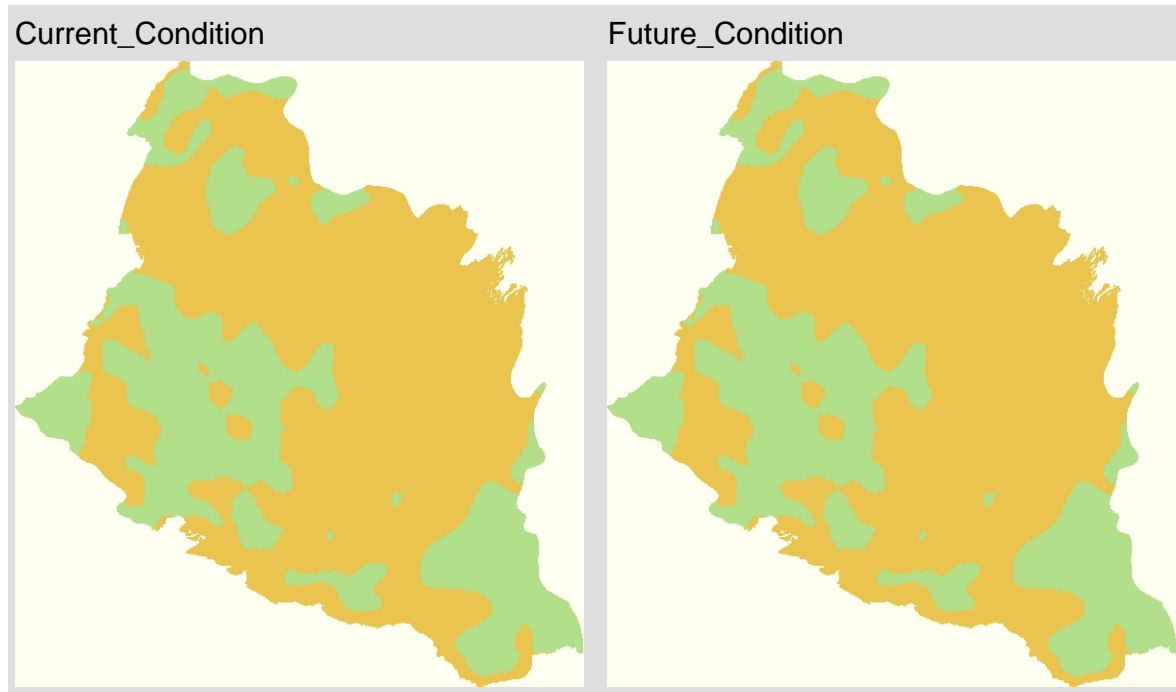
Prob. Class Fall Use



3.1

Category 2 Mapping for Ozhiski Range

Categorized: Winter Use within the Ozhiski Caribou Range



0 50 100 km

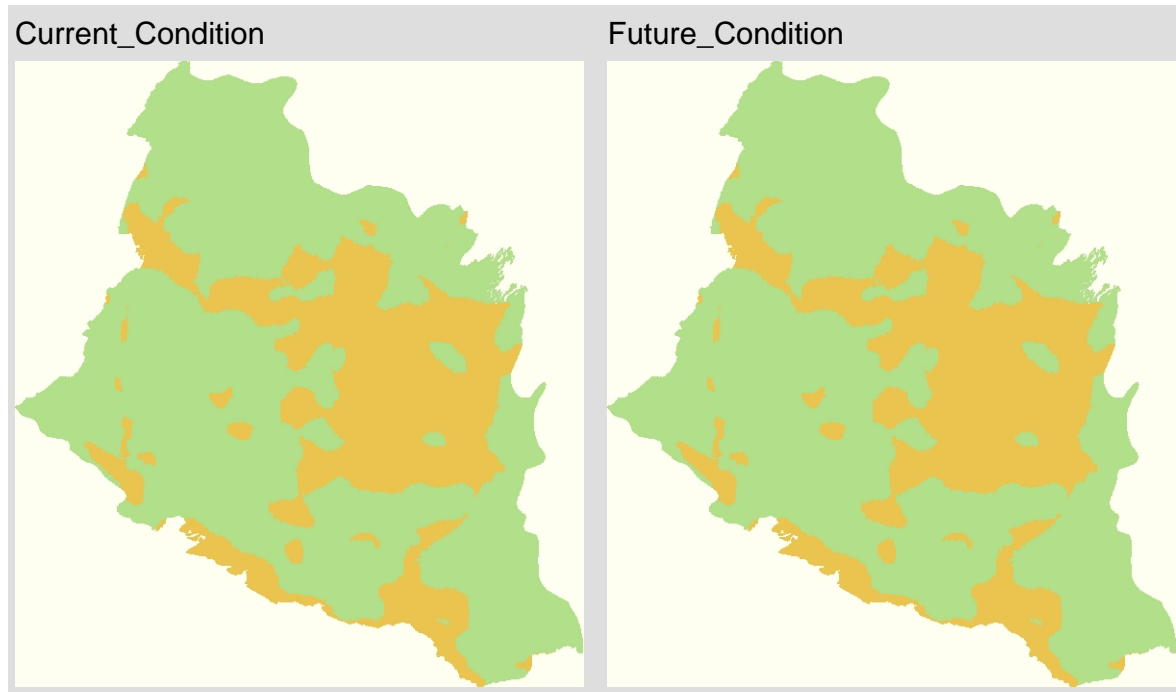
Prob. Class Winter Use

Low
High

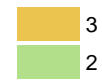
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Category 2 Mapping for Ozhiski Range

GHD Category 2 and 3 within the Ozhiski Caribou Range



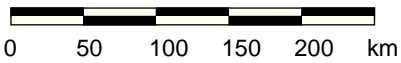
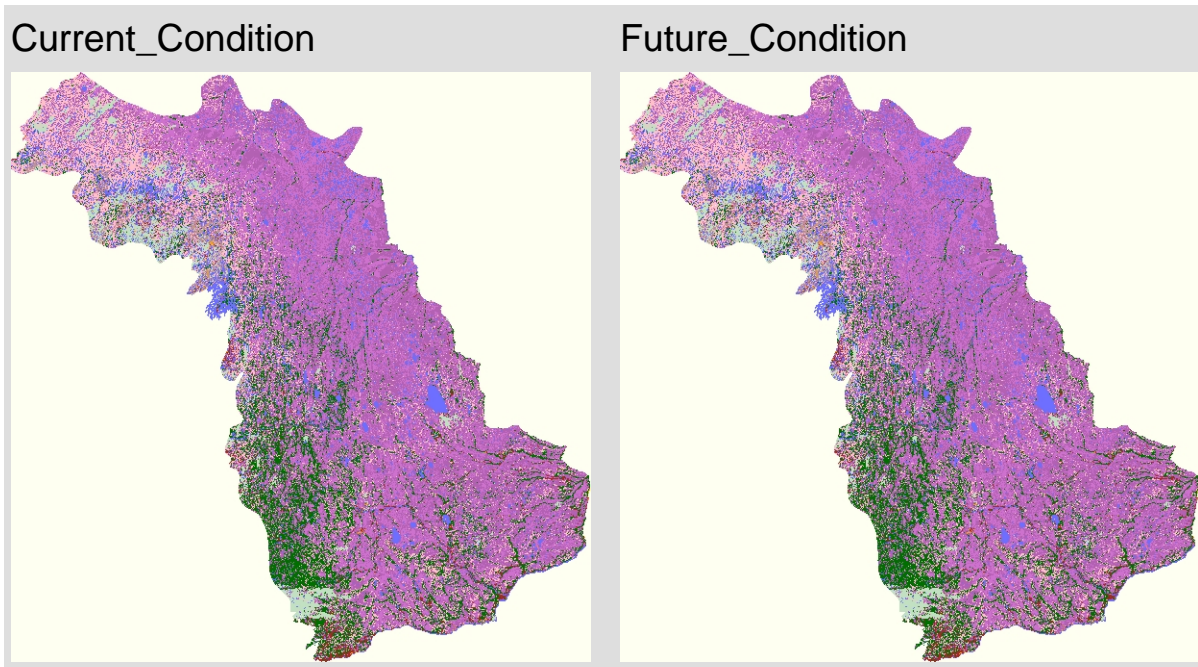
GHD Category



3.1

Category 2 Mapping for Missisa Range

Original Land Cover Class (2000) within the Missisa Caribou Range



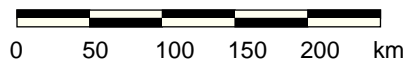
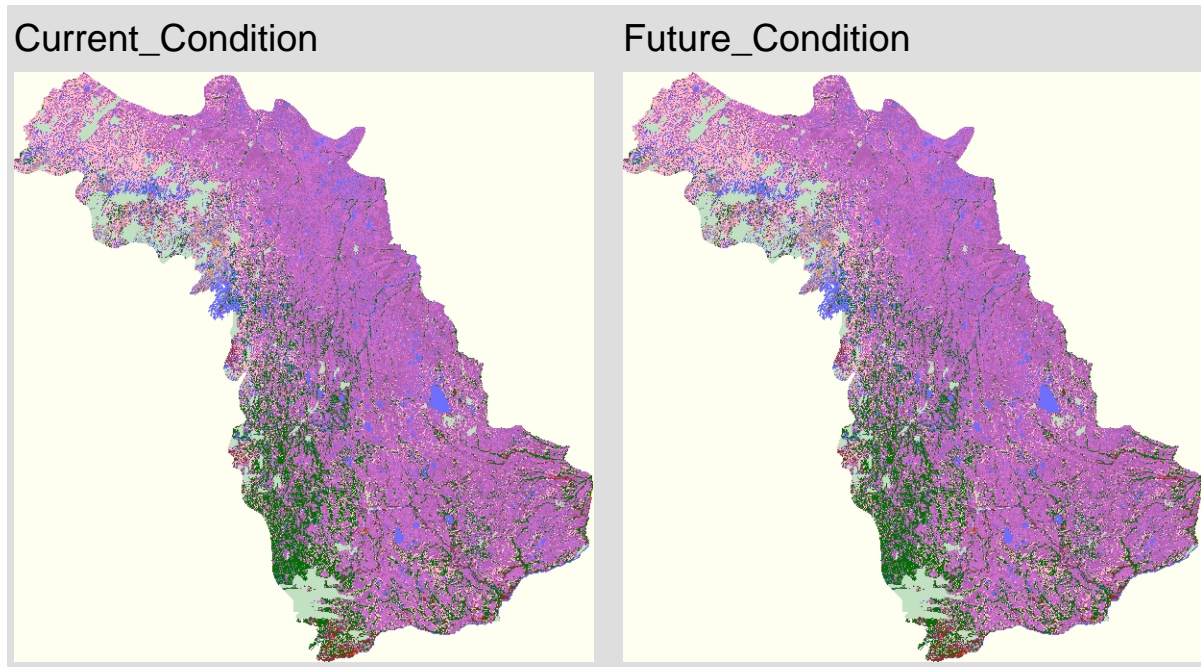
Land Class

- WAT
- STLM
- NFOR
- CUT
- BURN
- F_RP
- F_SP
- DEC
- MIX
- CON
- MSH
- SWP
- FBO
- FBT
- TDR
- AGR
- OTH

3.1

Category 2 Mapping for Missisa Range

Updated Land Cover Class within the Missisa Caribou Range



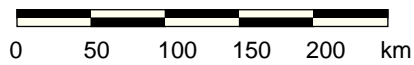
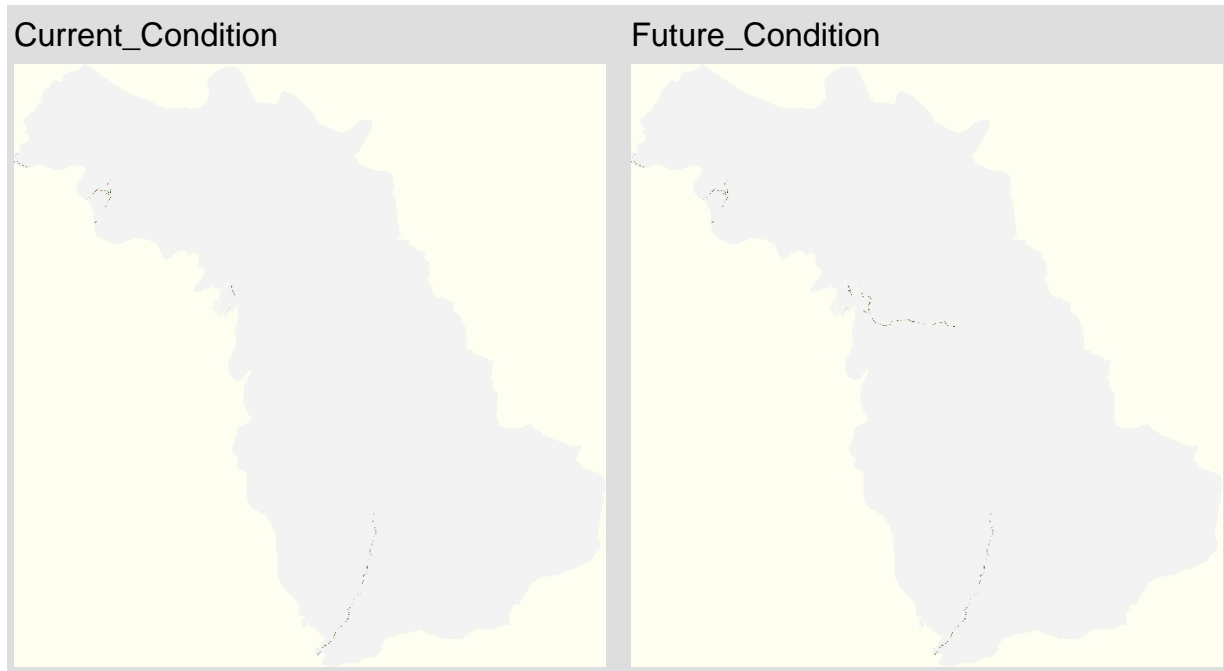
Land Class

- WAT
- STLM
- NFOR
- CUT
- BURN
- F_RP
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- FBT
- TDR
- AGR
- OTH

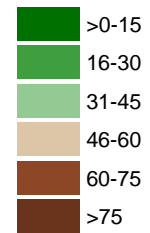
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Category 2 Mapping for Missisa Range

Roads within the Missisa Caribou Range



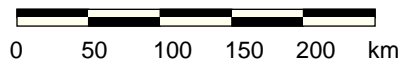
Density m/ha



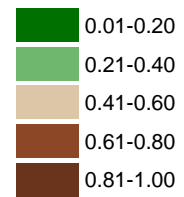
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Category 2 Mapping for Missisa Range

Settlements and Infrastructure (PLC Updated) within the Missisa Caribou Range



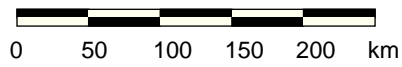
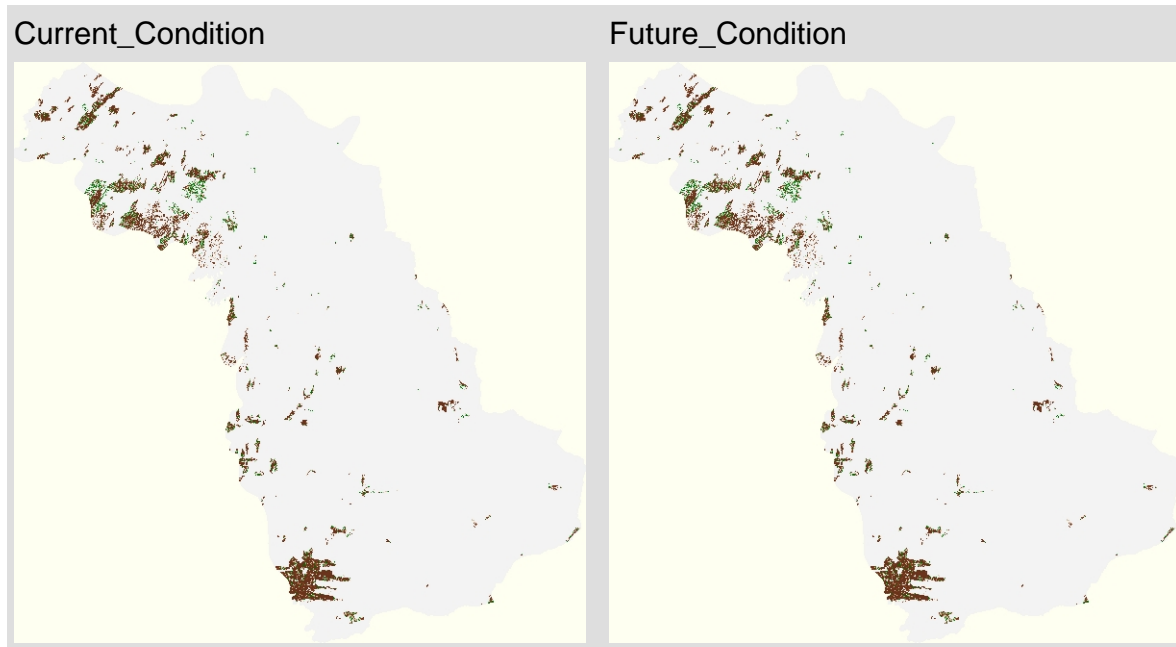
Proportion



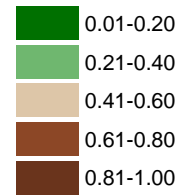
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Category 2 Mapping for Missisa Range

Natural Disturbance (PLC Updated) within the Missisa Caribou Range



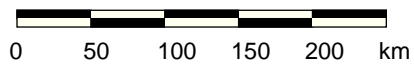
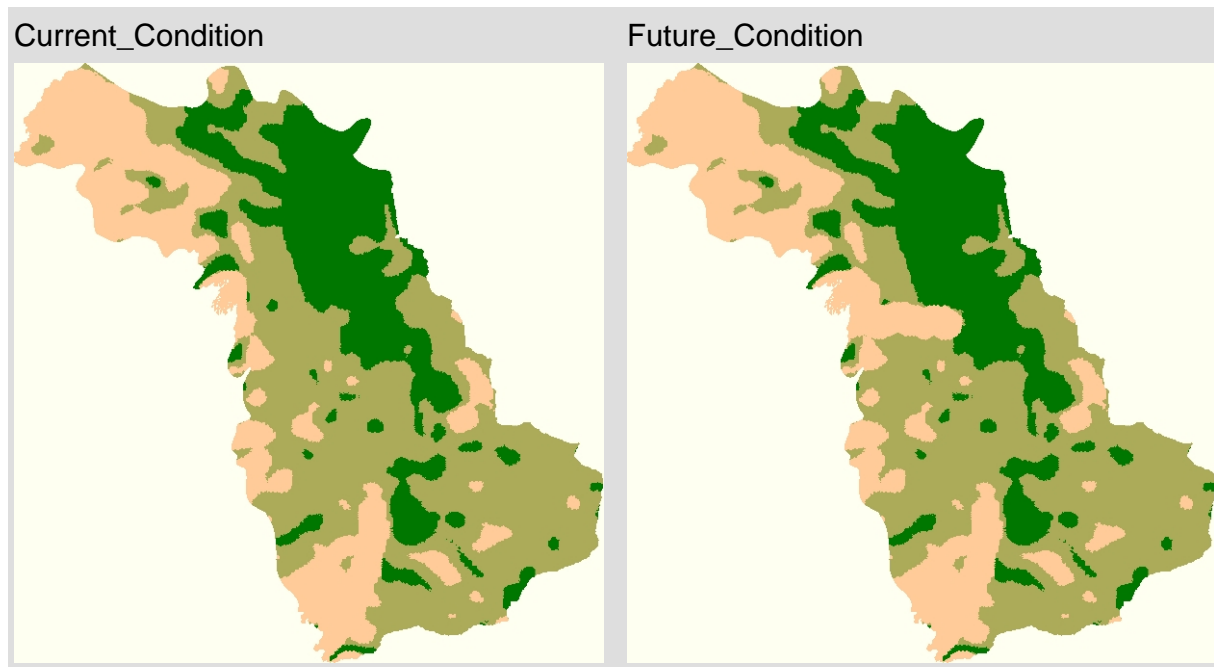
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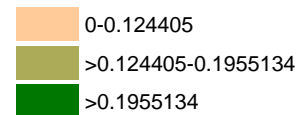
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Category 2 Mapping for Missisa Range

Probability of Spring Use within the Missisa Caribou Range



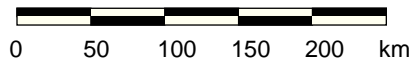
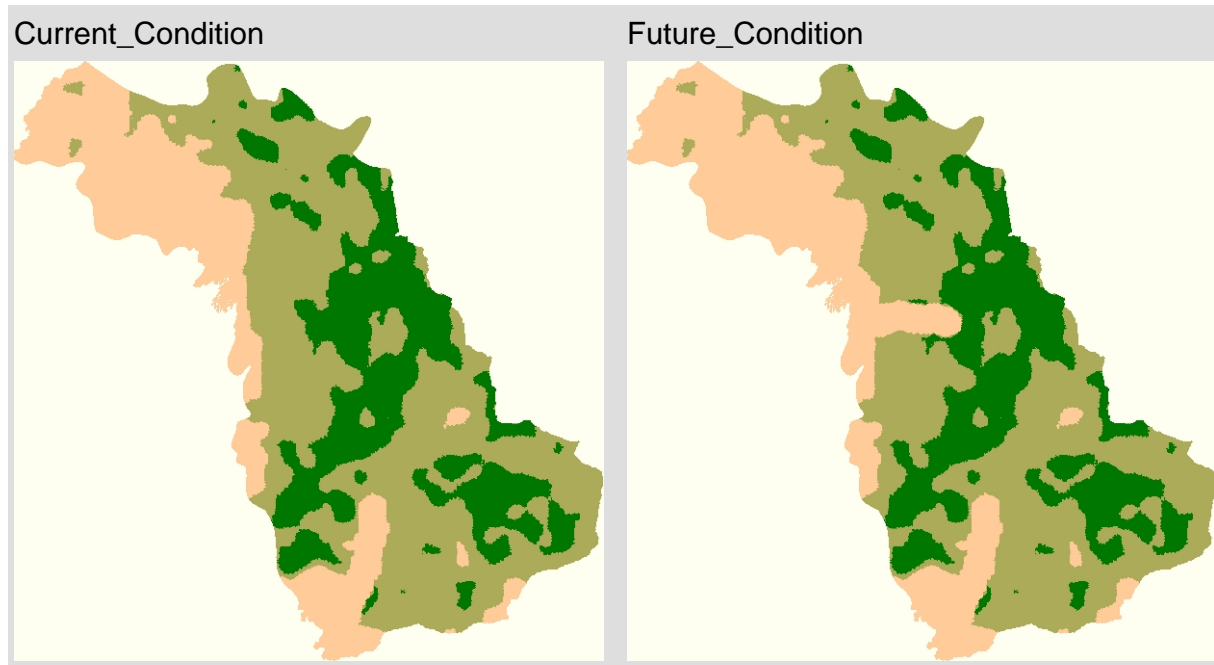
Probability of Spring Use



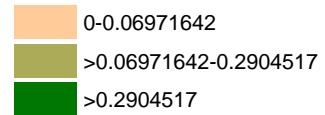
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Category 2 Mapping for Missisa Range

Probability of Summer Use within the Missisa Caribou Range



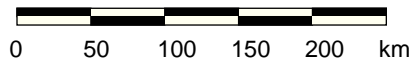
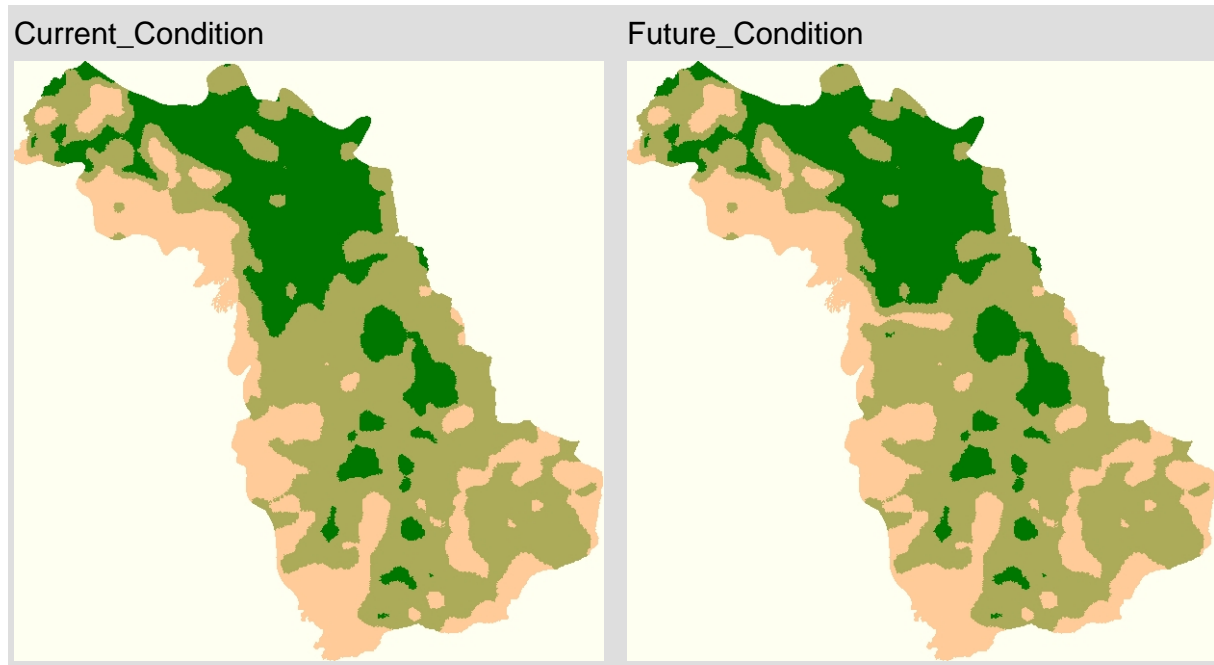
Probability of Summer Use



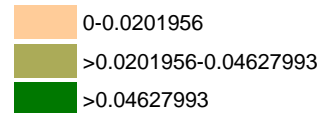
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Category 2 Mapping for Missisa Range

Probability of Fall Use within the Missisa Caribou Range



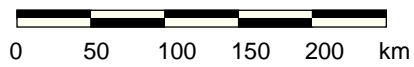
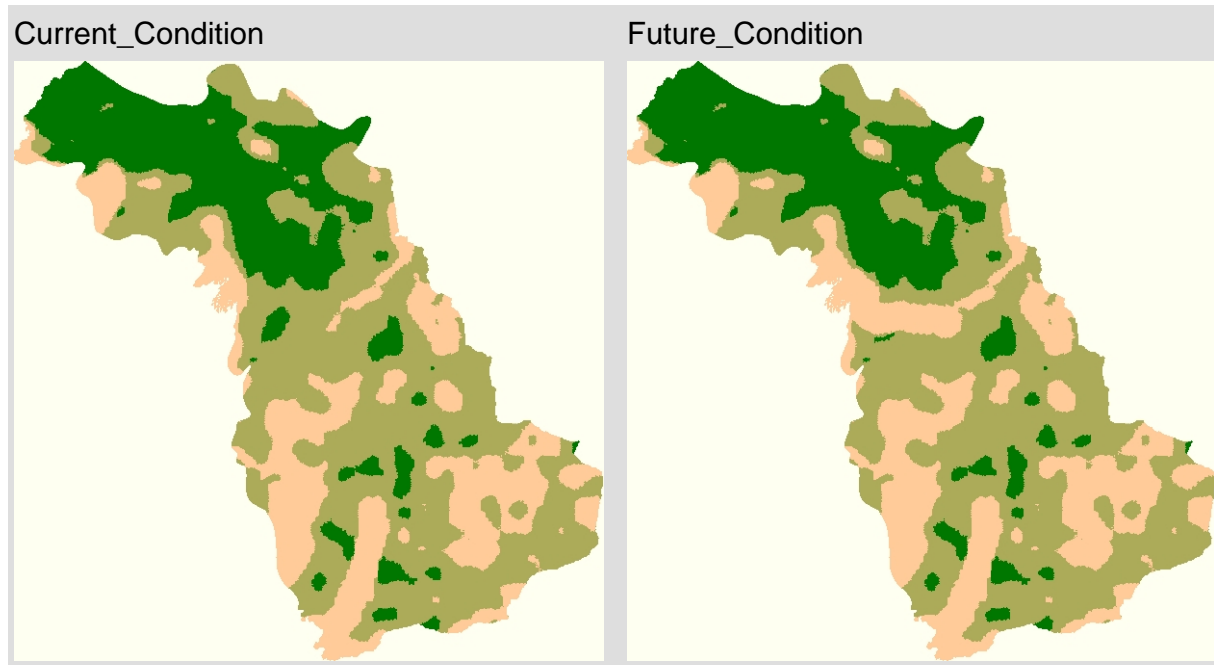
Probability of Fall Use



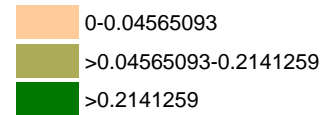
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Category 2 Mapping for Missisa Range

Probability of Winter Use within the Missisa Caribou Range



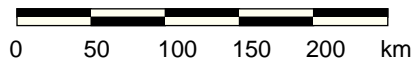
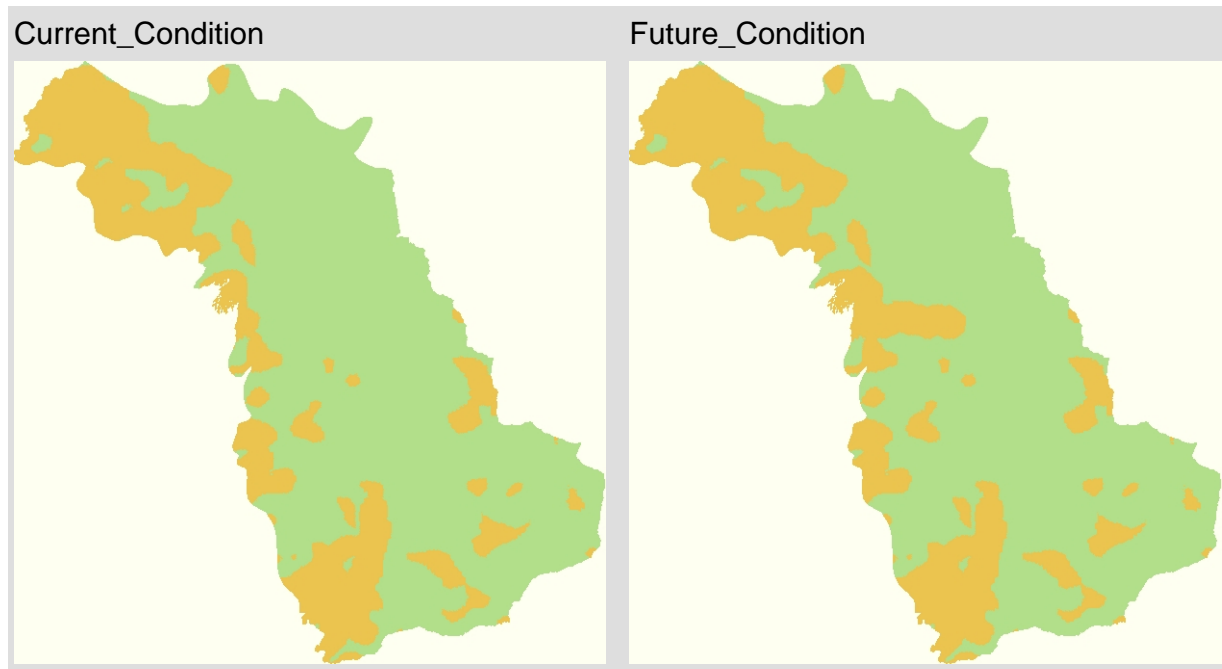
Probability of Winter Use



3.1

Category 2 Mapping for Missisa Range

Categorized: Spring Use within the Missisa Caribou Range



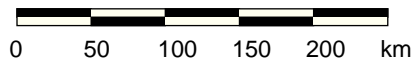
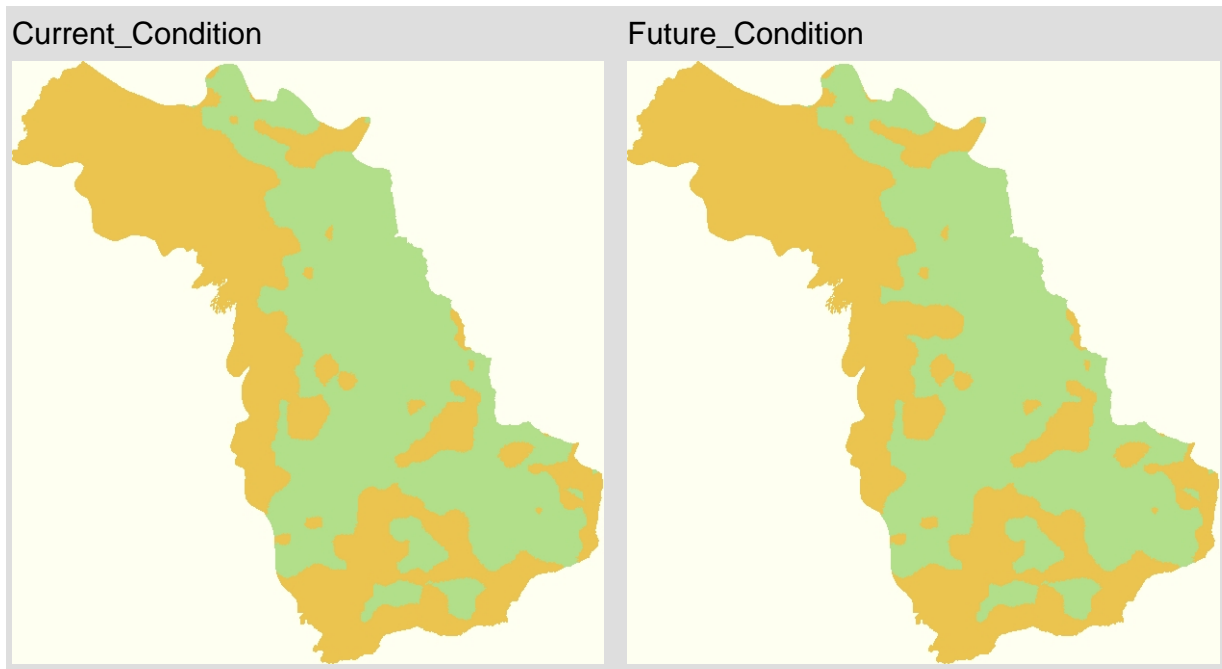
Prob. Class Spring Use



3.1

Category 2 Mapping for Missisa Range

Categorized: Summer Use within the Missisa Caribou Range



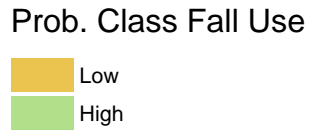
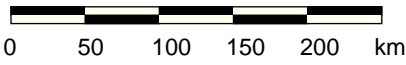
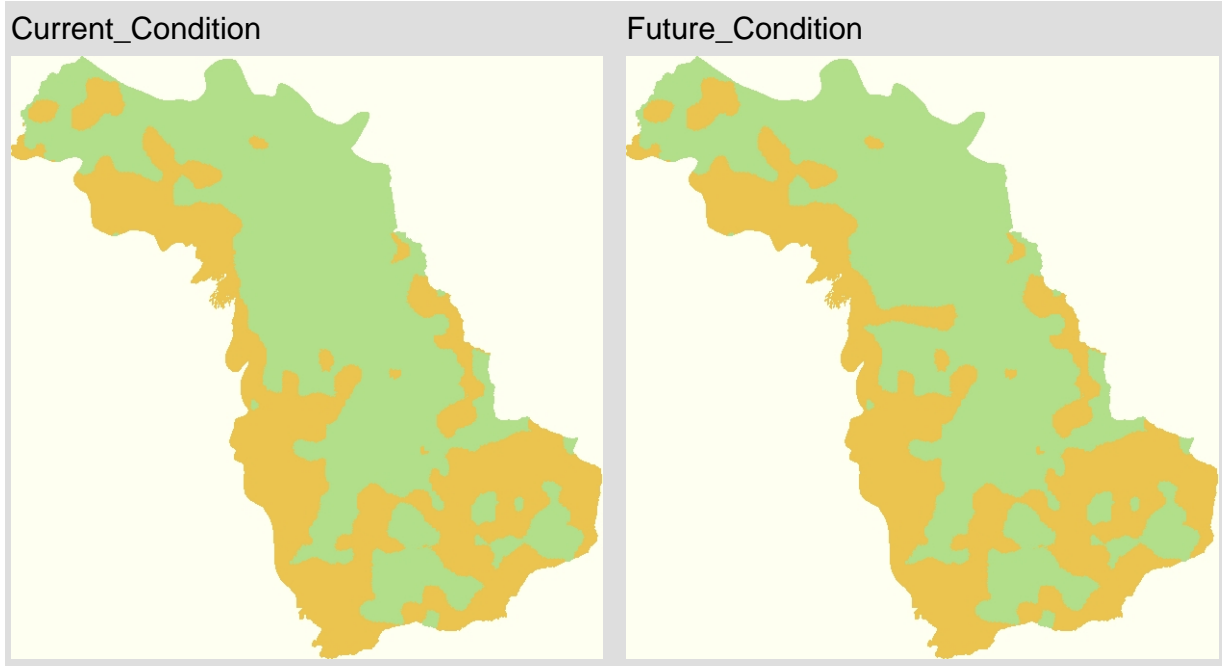
Prob. Class Summer Use



3.1

Category 2 Mapping for Missisa Range

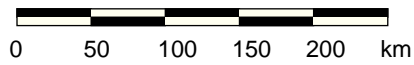
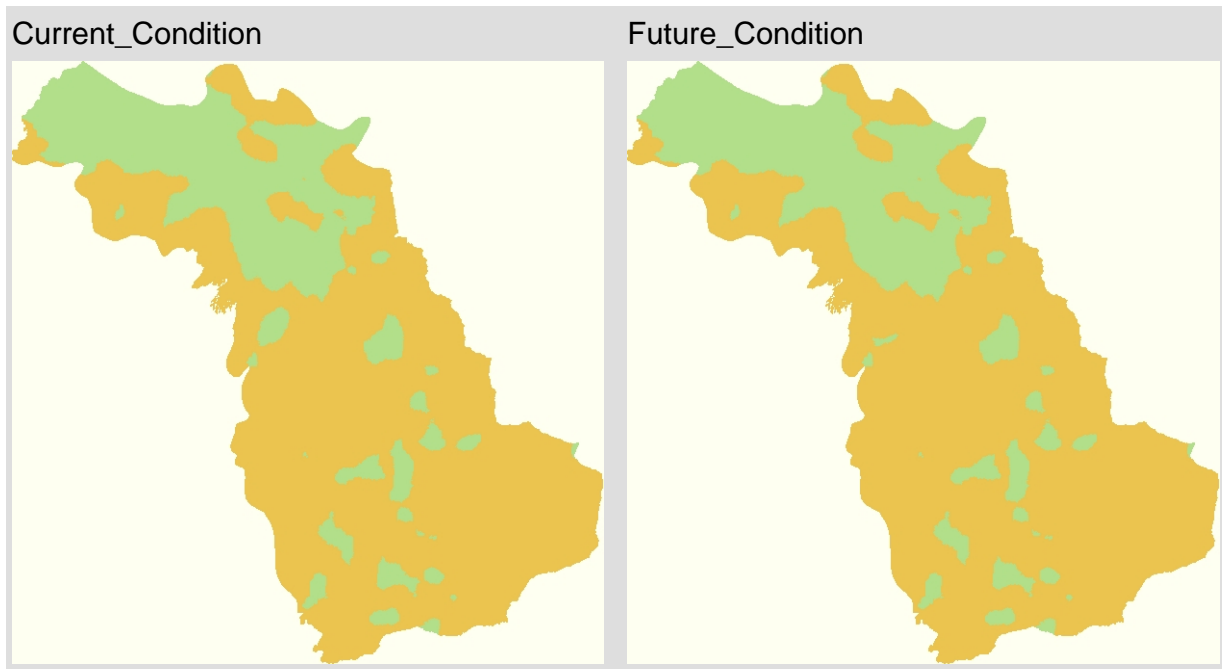
Categorized: Fall Use within the Missisa Caribou Range



3.1

Category 2 Mapping for Missisa Range

Categorized: Winter Use within the Missisa Caribou Range



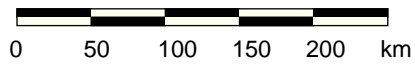
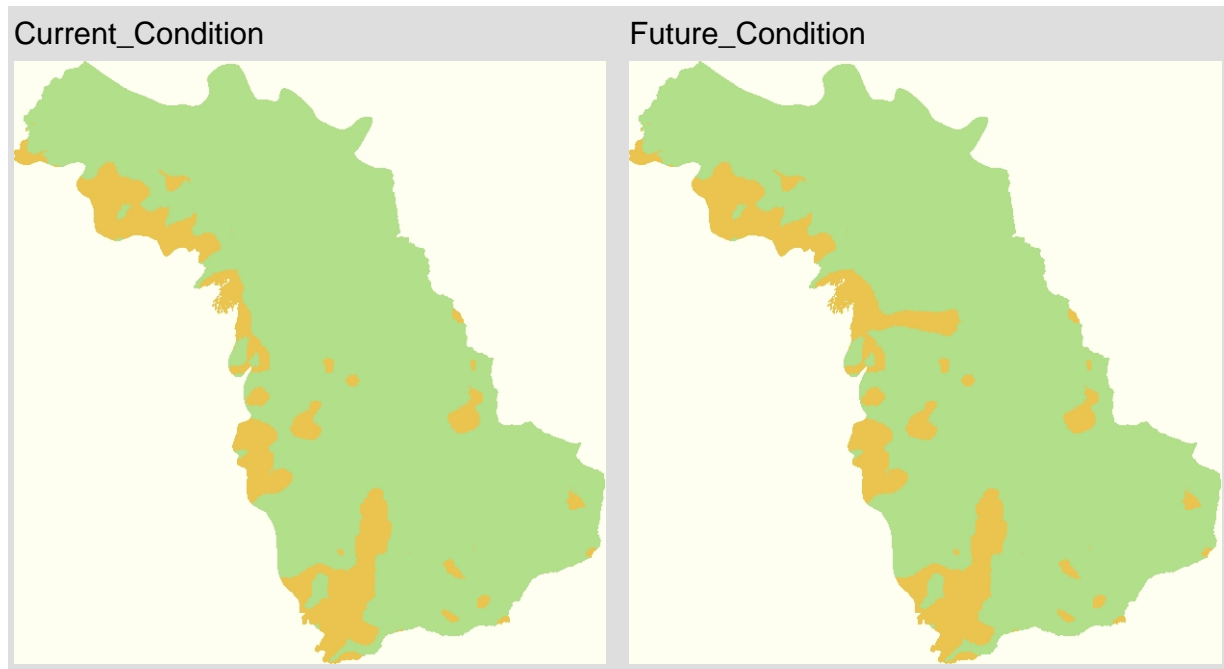
Prob. Class Winter Use



3.1

Category 2 Mapping for Missisa Range

GHD Category 2 and 3 within the Missisa Caribou Range



GHD Category

