The Potential Effects of Climate Change on the Habitat Range of the Vancouver Island Marmot

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Introduction

The Vancouver Island (VI) marmot is an incredibly vulnerable mammal and is listed as endangered internationally. Due to the rise in surface temperatures brought on by anthropogenic climate change, scientists believe that VI marmot habitat will be reduced in size in the future. Using specific habitat requirements determined through an extensive literature review (Table 1), this research project has calculated and mapped the VI marmot’s current potential habitat range as well as the projected potential habitat range.

Methods

Table 1: Habitat Requirements Used for Current & Projected Habitat Maps

<table>
<thead>
<tr>
<th>Factor</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>Biogeoclimatic zone</td>
<td>Coastal Western Hemlock, Mountain Hemlock, Coastal Mountain Alpine</td>
</tr>
<tr>
<td>Elevation</td>
<td>950 to 1500 m</td>
</tr>
<tr>
<td>Aspect</td>
<td>135° to 315°</td>
</tr>
<tr>
<td>Slope</td>
<td>30° to 50°</td>
</tr>
<tr>
<td>Soil Depth</td>
<td>&gt;10 cm</td>
</tr>
<tr>
<td>Snow Depth</td>
<td>&gt;10 cm</td>
</tr>
</tbody>
</table>

- Above 1500 m there is too much snow in spring when marmots emerge from hibernation as well as not enough soil to burrow
- Below 950 m there are too many trees that both restrict a marmot’s ability to see predators approaching and change the plant composition, which changes the available food sources
- Marmots prefer south- to west-facing slopes (135° to 315°) as they receive more sun and so snow melts earlier in the spring
- Snow creep on steep slopes (30° to 50°) prevents tree growth and creates more natural clearings
- Marmots prefer >1 m of soil to burrow in but have been known to burrow in shallower soils (>10 cm was used due to data limitations)
- Marmots require snow to insulate their burrows during the cold winter months (>10 cm was used due to data limitations)
- Current potential habitat makes up ~440 km² of the island
- Within the constraints modeled, marmots prefer natural clearings; this was not able to be mapped due to the resolution of the data

Current Potential Habitat Range

- Marmots require at least 10 cm of snow depth to insulate their burrows throughout winter
- Snow depth is projected to significantly decrease in the future due to a projected rise in surface temperatures
- This decrease will presumably affect water quantity on the island, and thus affect the availability of food sources for the marmot
- However, the areas where there will still be >10 cm of snow align, for the most part, with the elevation requirement used
- Thus, snow depth minimally affects the projected habitat range of VI marmot

Projected Potential Habitat Range

- Currently there are four biogeoclimatic (BGC) zones on VI
- Marmots prefer three, which currently make up ~95% of the island
- The map of projected BGC zones shows a significant decrease in two of these three key zones
- Although we know this will drastically change the vegetation of the island in the future, we do not know which of these three BGC zones marmots prefer
- The two projected BGC zones remaining that marmots prefer still make up ~95% of the island and so this requirement does not decrease projected potential habitat

- Using the six modeled habitat requirements, marmot habitat is projected to decrease by only ~1%
- This ~1% decrease is based on very conservative habitat restraints and in reality their habitat range would probably shrink much more

Conclusion

Although this study found only a minimal decrease in the projected VI marmot habitat, the overall trend in the future is clear. Due to the increase in surface temperatures caused by anthropogenic climate change, it is clear that suitable marmot habitat on VI will decrease. This decrease is expected to add to the vulnerability of the VI marmot and negatively affect the species’ ability to survive in the wild. It is suggested that future research on projected VI marmot habitat range should focus on predators and food sources, as well as on the adaptability of this vulnerable species.

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Notable Sources


Retrieved from the B.C.’s Coast Region: Species & Ecosystems of Conservation Concern website: http://dx.doi.org/10.4236/ns.2013.55A005

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