



Where the Land Can Support More Grizzly Bears

Cam McClelland et al.

We used fifteen years of field data to estimate carrying capacity for grizzly bears—a measure of the number of bears that area can support—by modelling the total digestible energy across the landscape. We then compared the difference between the carrying capacity and the number of resident bears in 60 watershed units to find where large differences in number occur.

To help further target management efforts, we filtered those areas for high road density, and identified 11 watershed units where access management and road density reduction may aid in increasing grizzly bear numbers so that bears can take advantage of a food-rich area without high mortality risk.

Approach

We used vegetation and ungulate data to model digestible energy. To determine the energy requirements per bear, we took a reference area that contains Alberta's highest concentration of grizzly bears (Willmore and Kakwa Wildlands) and divided that area's digestible energy by its grizzly bear population. By dividing this kilocalorie per bear number by the total kilocalories present in each watershed we estimated the carrying capacity for each watershed.

Limitations

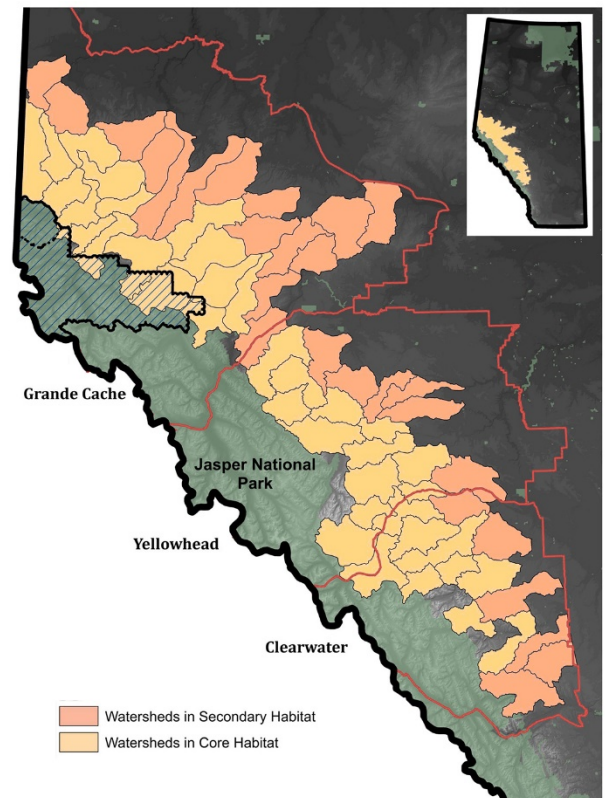
While total digestible energy is not the only way to estimate carrying capacity, food abundance is an uncontroversial correlate to population size, and this method captures the dynamism of the landscape. Future work could update carrying capacity models to take into account disturbance, regeneration, and a changing landscape.

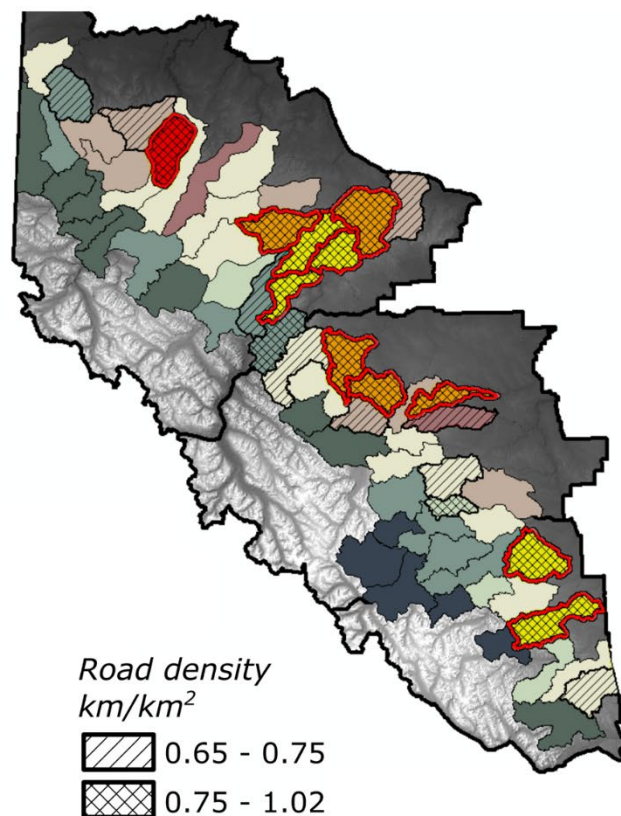
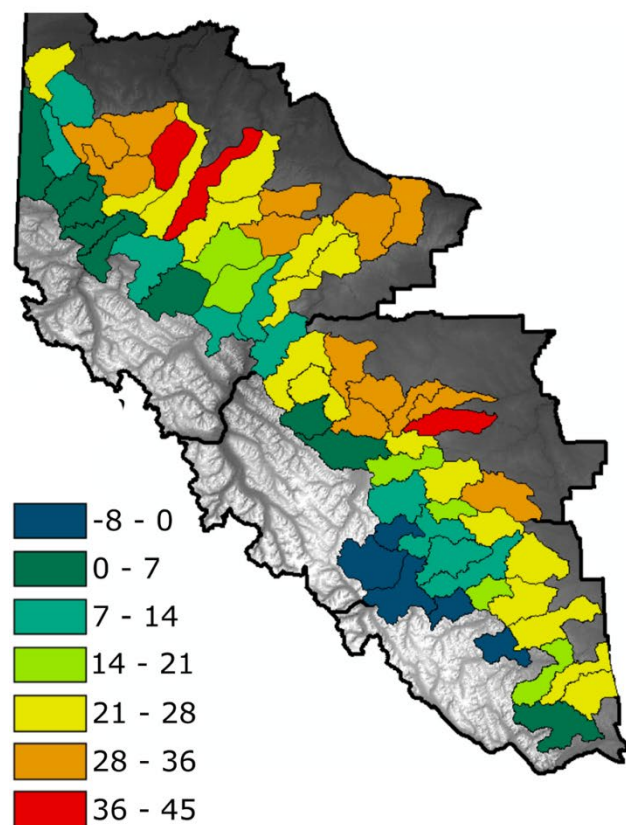
It's also important to remember that carrying capacity is a theoretical maximum, not a recommendation or target.

Results

We estimated the theoretical maximum grizzly bear populations in watershed units for Bear Management areas 2, 3, and 4. We then compared this to the number of resident grizzly bears in each unit, based on past population inventories. This let us determine areas that could support more bears than are currently on the landscape.

We also know that high road density is a major cause of grizzly bear mortality. By using road density as a filter, we narrowed the focus for restoration to just six watershed units in BMA 2, three in BMA 3, and two in BMA 4. Reducing road density, and therefore mortality, in these areas with a large difference between population and carrying capacity will allow us to maximize the conservation benefits of any restoration efforts.





Left: The difference between the number of resident grizzly bears and the watershed unit's estimated carrying capacity, in bears per 1,000 km². **Right:** the same, but with road densities overlaid. 11 priority watershed units are highlighted.

Opportunities and Acknowledgements

With these methods, food datasets could be used to estimate carrying capacity in the other four Bear Management Areas in Alberta, and other jurisdictions. With updated bear food surveys, carrying capacity could be tracked over time, and results could reveal where management efforts are the most efficient.

Full details are published in:

Cameron J.R. McClelland, Catherine K. Denny, Terrence A. Larsen, Gordon B. Stenhouse, Scott E. Nielsen. "Landscape estimates of carrying capacity for grizzly bears using nutritional energy supply for grizzly bears using nutritional energy supply for management and conservation planning." *Journal for Nature Conservation*. 2021.

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