

Using GIS to Assess Recreational Access in the High Peaks of Maine

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Introduction

Maine's High Peaks region, in the mountains of west-central part of the state, provides extensive recreational opportunities. Snowmobile, ski, mountain bike, and especially hiking trails serve as conduits for those seeking outdoor experiences (Maine Appalachian Trail Land Trust, 2017). However, trailheads in the High Peaks region of Maine are scattered across both public and private land on a road network with varying levels of maintenance. These factors, in combination with long drive times and unplowed roads often keep potential visitors away from hiking centers (Clawson and Knetsch, 2011). The objective of this study was to analyze the region's accessibility via road. Specifically, I wanted to know which trailheads were publicly owned and accessible in winter as well as roughly how much driving time is required to reach the trailheads.

Methods

I obtained road polylines and census block groups from the Maine Office of GIS. I downloaded U.S. Census Bureau statistics for 2006-2010 population and area at the census block group level from Social Explorer. I acquired aerial imagery from the USGS. I used Google Maps and Maine Trail Finder to identify 21 hiking trailheads and digitize corresponding, unmapped access roads using aerial imagery. Using personal knowledge, I added binary attributes to each trailhead to describe whether the trailhead was reachable by a normal car in the winter (if the road is regularly plowed). I also added an attribute to identify its ownership as public or private.

In ArcGIS 10.4.1 (ESRI), I created a network of Maine's public roads, trailheads, and their access roads. The map was projected using the NAD 1983, UTM Zone 19N coordinate system. I used Network Analyst to calculate four trailhead service areas for each half hour of driving time, up to two hours. Network Analyst calculated fastest routes from each trailhead to three border crossings to Québec, New Brunswick, and New Hampshire.

The census block groups were compared to the service areas to compute the total population in each, and correspondingly, how far residents would have to drive to reach the trailheads.

Results

An optimistically estimated 73% of all Mainers live within two hours' drive distance of one or more trailheads in the High Peaks region (Table 1). Around 33% of the population lives within 90 minutes, and just 10% live within an hour (Table 1). Route 27's entry into Québec was the closest border crossing at almost 83 minutes, while the drive time to New Hampshire via I-95 was 167 minutes and to New Brunswick on Route 1 was 255 minutes (Table 2). While 57% of these trailheads lie on publicly accessible land, 48% of all trailheads are accessible in winter (Table 3). Only 38% of all trailheads are both publicly owned and reachable in winter (Table 3).

Discussion

The most striking aspect of the results was the disparity in population distribution across the service areas. A majority of Maine's population (nearly 75%) live within a reasonable driving distance of the trailheads, making the High Peaks an attractive option for nearly 1,000,000 people (according to my optimistic figures). Border crossings into New Hampshire via I-95 and New Brunswick via Route 1 offer distant options for out-of-state recreationalists. However, the border crossing into Québec via Route 27 lies just 83 minutes away, offering a reasonable gateway for visitors from Montréal and Québec City. For those with a vested interest in the economic pull of the High Peaks, this is good news.

The population within such close proximity to the trailheads stands in stark contrast to the level of development within the region. Just 10% of Maine's already-low population live within an hour of the trailheads. The trailheads themselves are the crux of accessibility. Only 57% lie on public land, meaning that they are subject to reduced maintenance and heavy use at the discretion of their owners (usually logging companies). Furthermore, less than half of the trailheads are plowed in winter. The options for a

winter hiker in the High Peaks are essentially slashed in half, barring the addition of longer road walks. For those with vested economic interests in the High Peaks, this is bad news.

The combination of these factors results in considerable potential for increased visitation. A large consumer base is in place. More winter-accessible and publicly owned trailheads could result in more attractive options for Maine hikers.

My analysis has several limitations. Excessively large census block groups posed an issue, especially in northern Maine. Exceptionally large blocks result in especially optimistic driving time estimates, and actually results may vary depending on location within an individual block groups. Because each census block was included when the first road was within range, the results are considerably higher than actuality. The absence of road networks for New Hampshire and Québec hampered analysis. These factors resulted in more limited and less accurate drive time estimates. Additional data, such as trail mileage from each trailhead, current hiking usage data, and proximity to accommodations, could lead to more advanced analysis. For instance, trailheads could be ranked by visitation in order to identify those standing to benefit most from improvement.

Conclusion

Maine's High Peaks region offers recreational opportunities within a reasonable drive for the majority of the state's residents. However, a lack of trailhead development impacts the region's accessibility to drivers, especially in the winter and early spring. This impacts local business owners and investors, as it increases reliance on seasonal tourism. Though the population base is strong, infrastructure improvement is necessary in order to increase visitation.

Acknowledgements

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References

Clawson, M. and J. N. Knetsch. (2011). Economics of Outdoor Recreation. RFF: New York.

Maine Appalachian Land Trust. (2017). High Peaks Initiative [Cited April 30, 2018] available from <http://matlt.org/high-peaks-initiative/>

Table 1.

Driving Time (min)	Pop. in Range	Percentage of Population	Total Percentage
< 30	40,507	3%	3%
30 - 60	94,824	7%	10%
60 - 90	305,743	23%	33%
90 - 120	529,633	40%	73%
120 +	356,958	27%	100%

Table 2.

Mean Times to State Borders	
Québec (ME Rte. 27)	83 minutes
New Hampshire (I-95)	167 minutes
New Brunswick (US Rte. 1)	255 minutes

Table 3.

Trailhead Characteristics	
Winter Accessible	48%
Publicly Owned	57%
Both	38%

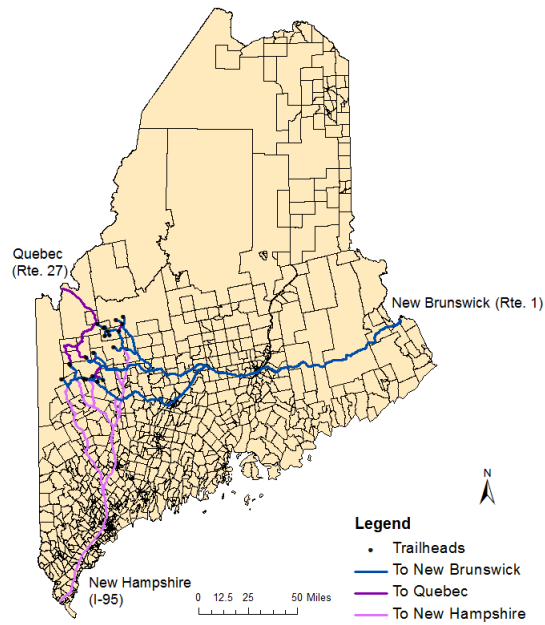


Figure 1. Fastest Routes

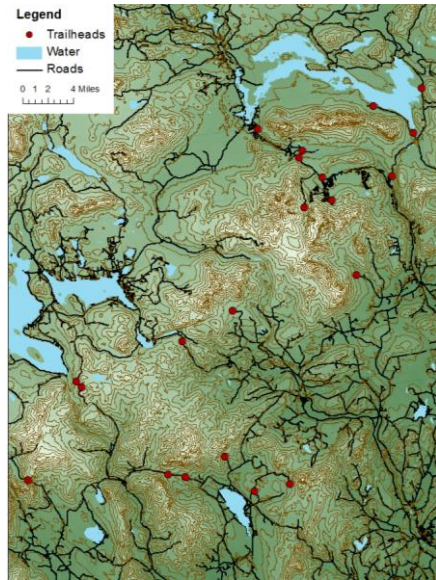


Figure 2. General Distribution of Trailheads in the High Peaks Region

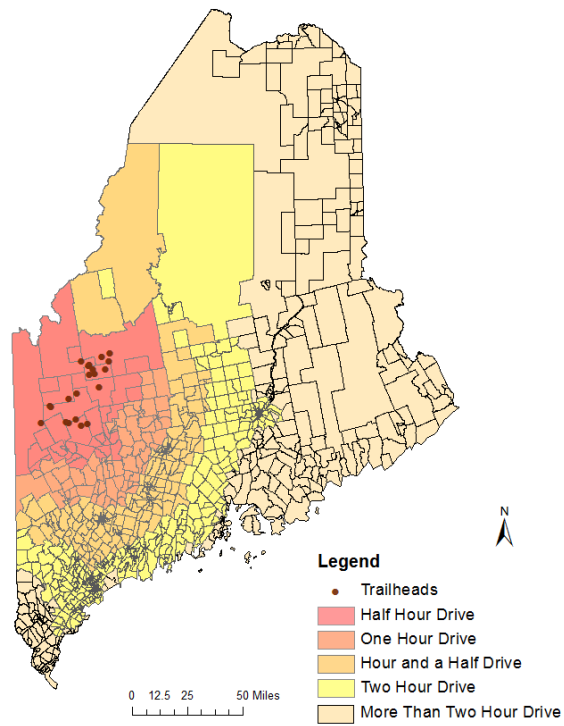


Figure 3. Approximate Drive Times to High Peaks Trailheads for Census Block Groups