

Over the River and Through the Woods: a bicycle touring suitability map for Massachusetts

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Purpose

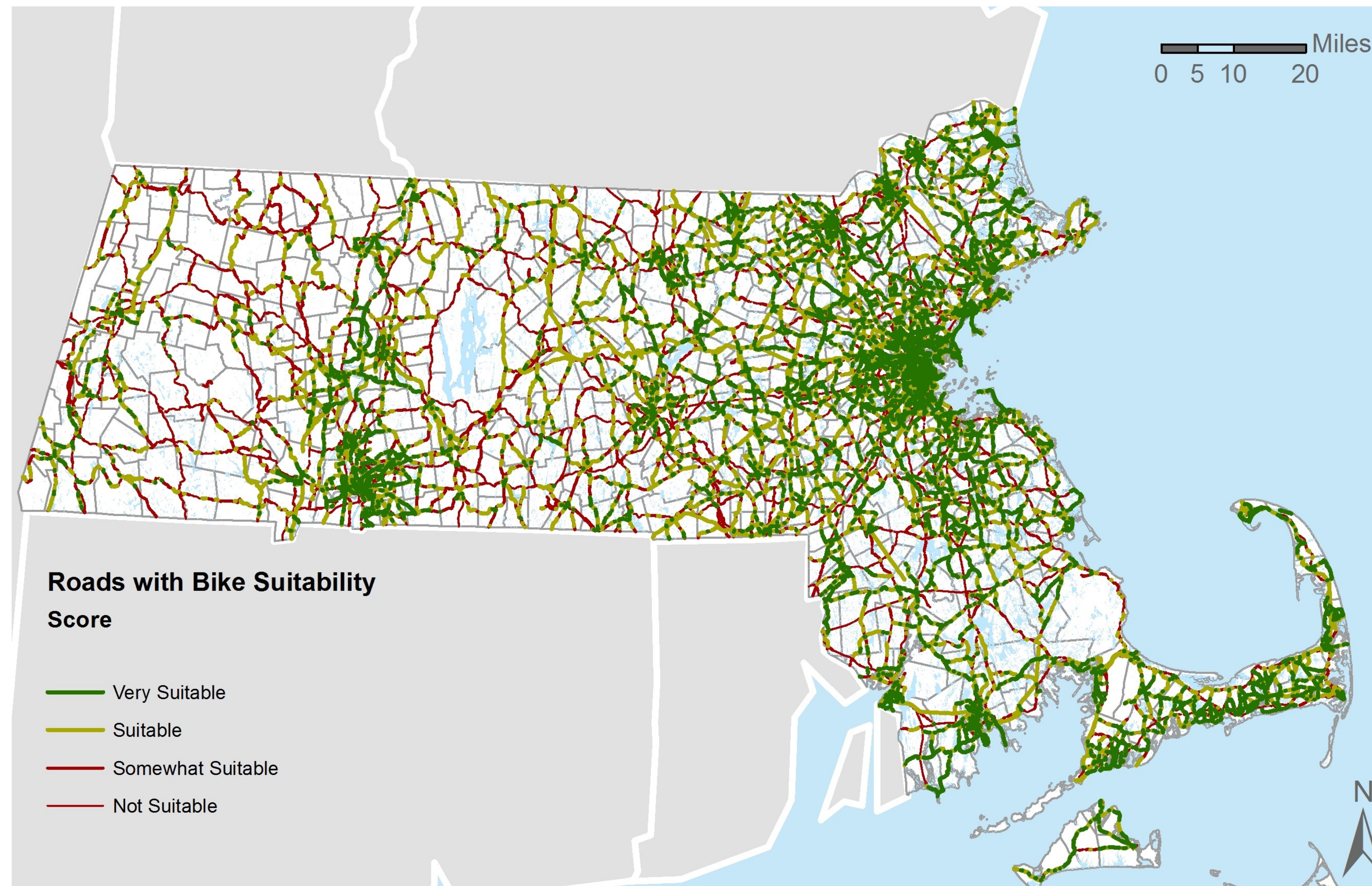
The goal of this project is to create a bike suitability index map for the state of Massachusetts. The bike suitability index map will provide a guide for bicycle tourists to select roads that are safe and scenic, maximizing the pleasure of bicycling. The map will also work to find routes, using the least cost path analysis tool. Bike tourism is a favorite American past-time, a way to increase physical and mental health, and a boost to local economies that border popular bike routes. Bike suitability maps are not new. Several map companies, including Rubel BikeMaps, have produced maps that highlight the most pleasurable and safe roads. Others are effective navigational tools, including the online Google Maps tool, which selects routes between points that are especially tailored with cyclists in mind. However, combining the two tools, a visual display of roads and a navigational feature, is unique to this project.

This project is of particular interest to me, the author, because it is intended to be practical in finding routes for spring-time bicycle outings. At some point, I plan on bicycling from my home in Arlington, MA, to my grandmother's house in Buffalo, NY. Over the river (the Connecticut and the Hudson), and through the Berkshires, to Grandmother's House, I bike!

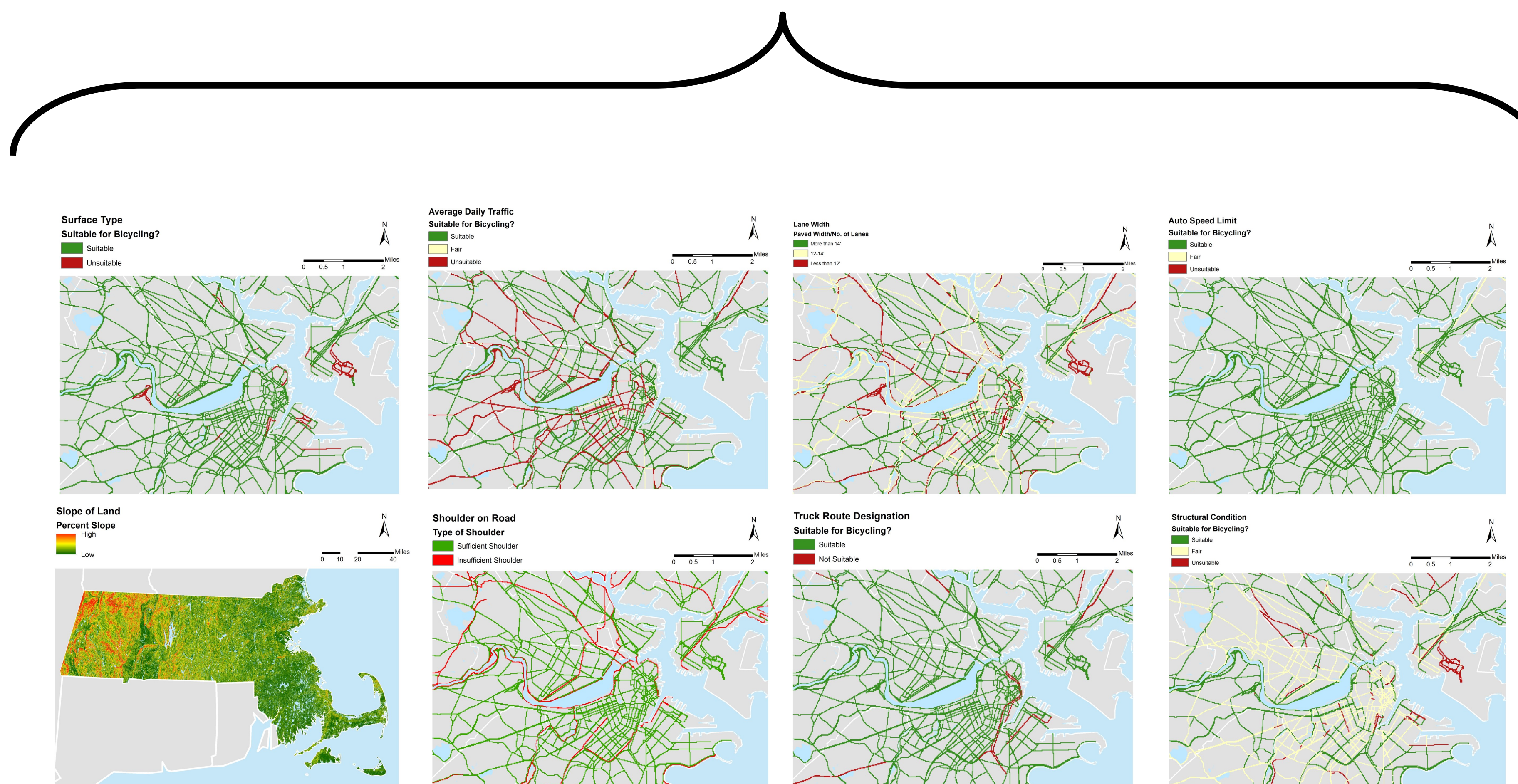
Criteria

The bicycle suitability index was based on the following criteria and weighting:

Criteria	Range	Weighting	Divide by Range	Weight factor: weight divided by range
Structural Condition	1-3	0.025	3	0.008
Surface Type	1-2	0.025	2	0.013
Shoulder	1-2	0.025	2	0.013
Lane Width	1-3	0.025	3	0.008
Truck Route Designation	1-2	0.1	2	0.050
Traffic Counts	1-3	0.2	3	0.067
Speed Limit	1-3	0.2	3	0.067
Distance to Open Space	1-3	0.1	3	0.033
Distance to Scenic Area	1-3	0.1	3	0.033
Slope	1-3	0.2	3	0.067
TOTAL		1		0.358



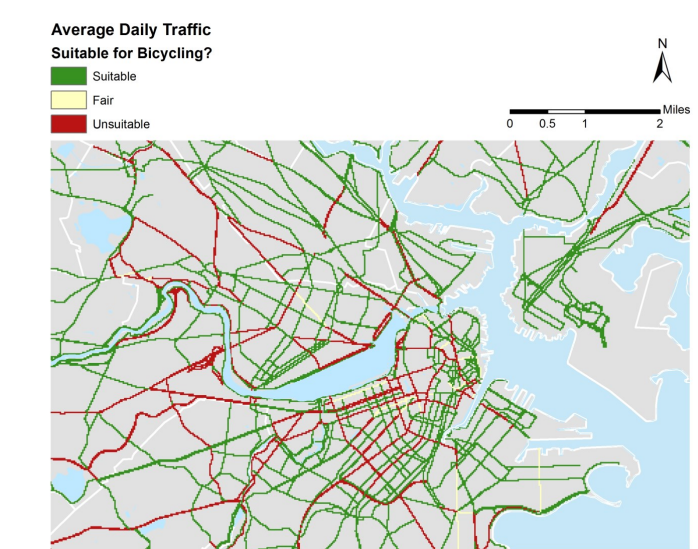
Map showing the bike suitability when the cell-by-cell values are averaged so that each road segment receives one value.



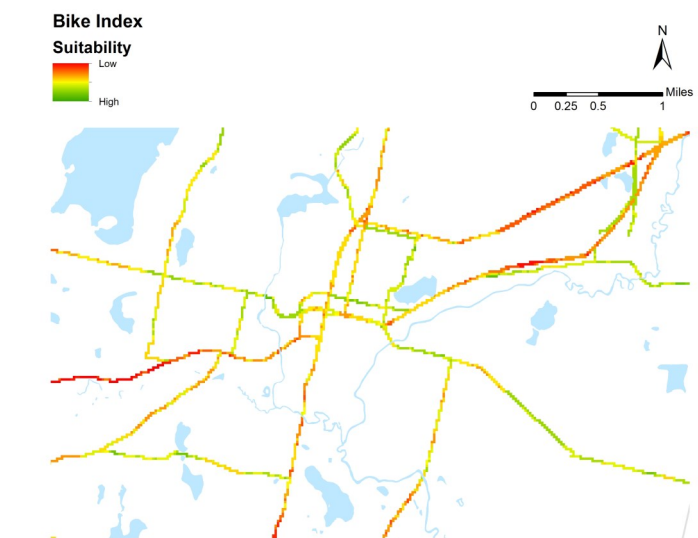
All maps were created with data from MassGIS, MassDOT, Massachusetts Department of Environmental Management, and the MA Executive Office of Energy and Environmental Affairs.

Process

The process included "rasterizing" the roads of Massachusetts and giving them the values of the different criteria. For example, a raster for daily traffic volumes was created with the cell value equal to the number of vehicles per day. The roadways are presented as 30X30m cells.



Once the ten rasters were created, the cells were merged using a raster calculator and the weight factors illustrated in the criteria section of this poster. In the end, each cell of roadspace was given a unique value that illustrated its biking suitability.



The raster was then re-attached to road layers using the join by spatial location tool. The original roadways were then assigned a single value for the mean score of the raster under that road segment. For example, a road segment with mostly level ground but one steep hill would be given a low steepness score. This proves to be a limiting element of the project, but, without re-attaching the bike suitability to line segments, the raster is nearly impossible to visualize on a state-wide scale.

Conclusions

The project successfully built a road layer complete with a score for bike compatibility index. The project was not, however, successful at creating a route-finding tool. The Cost Distance tool was not co-operative. Other criteria that would have been good to consider are vicinity to ice cream shops, vicinity to campgrounds, and vicinity to water sources. Future bike map projects could consider these elements. Special thanks to the MassGIS, MassDOT, Barbara Parmenter, and Eliza Whiteman for their assistance in this project.