

Where is the best place to go fishing: Identify suitable fishing spots in Massachusetts



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INTRODUCTION

Massachusetts has more than 1200 miles of coast and hundreds of lakes, ponds and streams. The geographical advantages make the state a special place for all types of water recreation (Robinson et al., 2004). Such recreation like fishing is a component of the culture, a popular pastime, and a driver of the economy (Foster, Hall, Barry, Clayden, & Parshall, 2002).

An appropriate location for a fishing plot is related to residents of Massachusetts; and it may also provide some suggestions for developers of tourist industry, especially those from fishing industry in Massachusetts. The fishing plots selected should be have enough space for people to have fun, but also for those who live nearby to have easy access.

However, the presence of dams has some negative effects on aquatic ecosystems: when building dams, river is usually directed elsewhere through a tunnel. The major aquatic life is directly affected by this. Some species that is low on tolerance can become extinct as a result of this direction change. Furthermore, the dams have a negative impact of climate change and they can deprive ecosystems of nutrients, and destroy habitats (Young, Smart, & Harding, 2004). Therefore, it is necessary to take the presence of dams into consideration when choosing a suitable fishing spot.

Spatial question: Where is the optimal place for residents in Massachusetts to go fishing?

METHODOLOGY

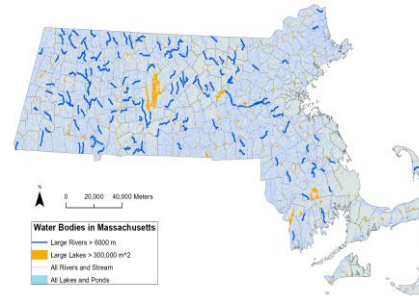
All the maps involved in this project were made by using ArcMap 10.8. The input data includes one point-shapefile: the locations of dams; two line-shapefiles: rivers and major route; two polygon shapefiles: lakes and census tracts; and population data. Before conducting the analysis, all the layers to be used were projected with "NAD 1983 StatePlane Massachusetts Mainland FIPS 2001" coordinate system.

Then, features of interest were selected from the given sources. Rivers and streams which are longer than 6,000 meters, and rivers and ponds larger than 300,000 square meters were selected by attributes and were treated as "large water bodies". After that, we used a spatial query to select accessible and large water bodies with a 3,000-meter search distance from the major route. Meanwhile, a 3,000-meter dissolved buffer was generated from the location of dams. Large and accessible water bodies that intersect with the given buffer were excluded from the original selection.

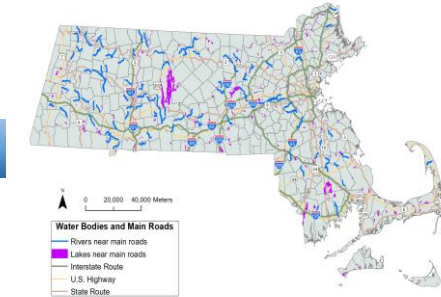
Based on the census population data, the population density of each census areas was calculated. After conducting a join between the census tracts and population estimates data, areas with a high population density were selected. The population density was divided into quartiles, and the third and fourth quartiles were considered as "high population density". After that, water bodies near these high population density areas were identified by using the intersection tool. Finally, the optimal locations were selected.

RESULTS

Large water bodies



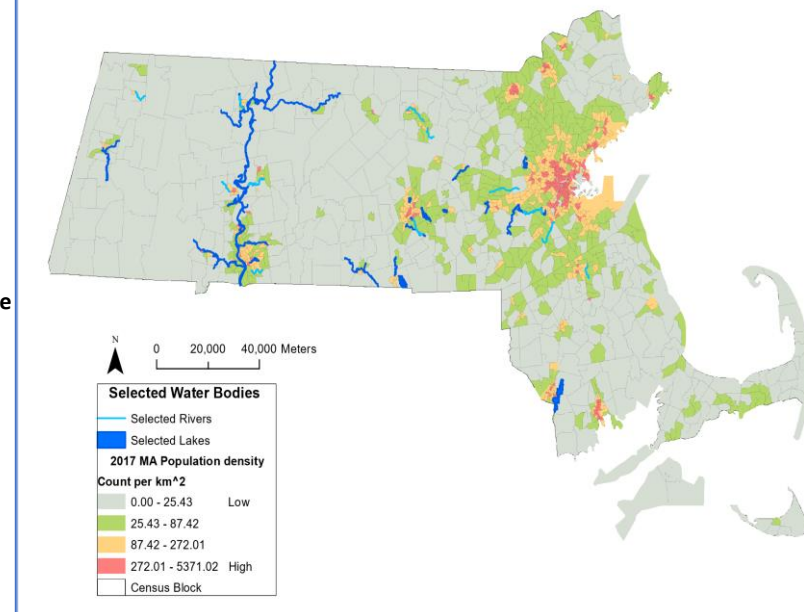
Large water bodies accessible by major route



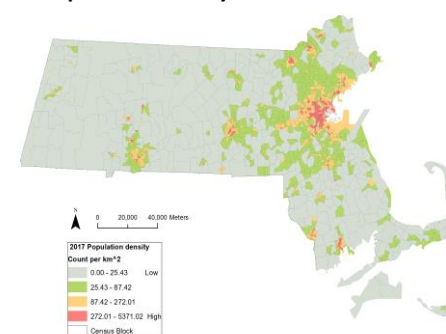
Large water bodies 3km away from dams



Selected Water Bodies



Population density



Cartographer: Chengshu Zhu
and Ziyu Wang

Date: 26 April 2020

Projection:
NAD 1983 StatePlane Massachusetts
Mainland FIPS 2001

Map Data Sources:
U.S. Census Bureau,
U.S. Bureau of Geography Information

LIMITATIONS

The census data was collected based on census tracts, which would be less precise than block group. And the data was collected in 2017, the true number of population within each census tracts may not be presented by this census data.

The water bodies layer can only present the locations with water features, however, it's not known whether that specific water area have any or enough number of fishes exist.

The intersection tool only selected water features beased on spatial relationship with areas with a high population sensity. But the water features that are more suitable areas for fishing but located further away from the populated may not be selected.

CONCLUSION

Table 1. Summary of the number of selected water bodies in each step

Step	No. of Selected Rivers	No. of Selected Lakes
Original data	59,639	3,971
Large water bodies	146	180
+ Accessible water bodies	98	180
+ 3 km away from dams	89	139
+ Located in high-population-density blocks	12	16

There are 12 rivers and 16 lakes that are the most accessible and suitable fishing spots in Massachusetts because they can be reached by the main roads, near by the highly populated areas, and located away from dams.

The first two criteria were used to make sure the location selected can be easily reached by MA residents for recreational fishing. And the third criteria were used as a parameter for suitability.

Because of the limitations of this analysis that were discussed in the previous section, further study may need to be conducted based on fish habitat and other influential factors.

ADDITIONAL INFORMATION

Analytical sources:

Foster, D. R., Hall, B., Barry, S., Clayden, S., & Parshall, T. (2002). Cultural, environmental and historical controls of vegetation patterns and the modern conservation setting on the island of Martha's Vineyard, USA. *Journal of Biogeography*, 29(10-11), 1381-1400.

Robinson, K. W., Flanagan, S. M., Ayotte, J. D., Campo, K. W., Chalmers, A. T., Coles, J. F., & Cuffney, T. F. (2004). *Water quality in the New England coastal basins, Maine, New Hampshire, Massachusetts, and Rhode Island, 1999-2001*(No. 1226). US Geological Survey.

Young, R., Smart, G., & Harding, J (2004). Impacts of hydro-dams, irrigation schemes and river control works. *Freshwaters of New Zealand*, 31-37.

Header Photo: Massitsallhere