Residence Density Near Vermont Lakes

Summary

The data below show an overwhelming disparity between residence density near lakes and the remainder of the state. The density of lake-centered residences in Vermont is more than double that in the urban areas of the state. **This indicates that Vermont's lakeshores receive some of the greatest amount of development pressure of any land area in the state.**

Research by the Vermont Agency of Natural Resources and others has shown that unbuffered lakeshore development has had a significant adverse impact on lake water quality and aquatic habitat. The proportion of Vermont residences within 100 feet of a lakeshore (4.4%) is quite small in relation to the number of residences that are not located near lakes (95.6% of Vermont residences are built more than 100 feet from the lakeshore). Therefore, **less than 5% of the residences in the state are directly affecting the quality and long term health of Vermont lakes.**

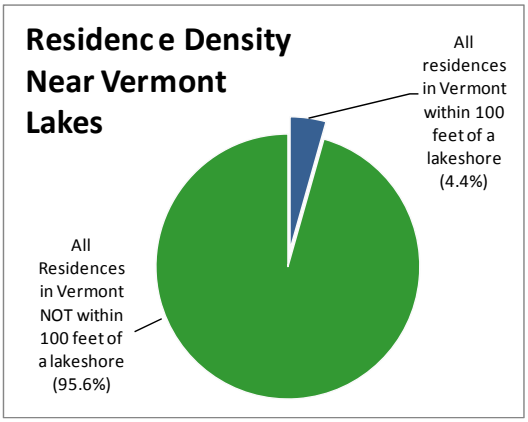

Table 1. Residence density data in relation to geographical areas in Vermont.

Geographical Area	Percent of All Residences in Vermont	Residence Density (Number of houses per sq. mi.)
All residences in Vermont set back more than 250 feet from a lakeshore (See Fig. 1)	86.8%	26
All residences in Vermont set back more than 100 feet from a lakeshore (See Fig. 1)	95.6%	28
Urban Areas (See Fig. 2)	26.3%	198
All residences in Vermont built within 250 feet of a lakeshore (Shoreland Area)	13.2%	484
All residences in Vermont built within 100 feet of a lakeshore (Lakefront Area)	4.4%	402

Data Sources

Data used to calculate housing density near lakes were obtained from GIS spatial analysis of three datasets: **Vermont E911**, **Vermont Lakes Inventory**, and **Urban Areas** (Fig. 1), which are all available from the Vermont Center for Geographic Information (vcgi.org). The E911 layer, which contains location and type information on buildings in the state, was first published online December 7, 2012 and last updated on October 23, 2012. Only a

subset of E911 building categories were used to reflect which features are likely private residences (hereafter called “residences”). Other types of development, such as commercial and public buildings or utilities, are not included in these calculations. The categories used here are listed below:

'CAMP', 'COMMERCIAL W/RESIDENCE', 'MOBILE HOME', 'MULTI-FAMILY DWELLING', 'OTHER RESIDENTIAL', 'RESIDENTIAL FARM', 'SEASONAL HOME', 'SINGLE FAMILY DWELLING'

Calculations

To calculate proximity to lakes, distances were calculated from lake features in the Lakes Inventory spatial dataset in GIS. Proximity to lakes is presented in two ways – a 250 ft. buffer (Shoreland Area) and a 100 ft. buffer (Lakefront Area) (Fig. 2). The “urban areas” dataset was used to perform calculations related to housing density in Vermont’s urban centers. Land area calculations were made after subtracting the surface area of lakes and limiting all calculations to areas within Vermont’s state border.

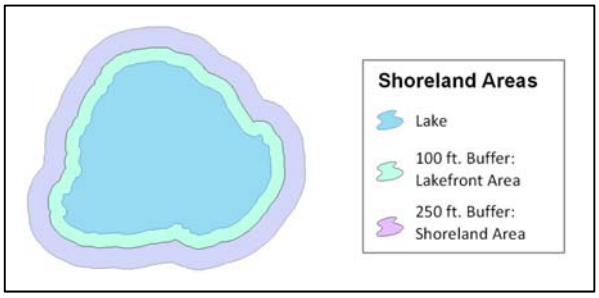

Figure 1. Representation of the shoreland areas used in the calculations here.

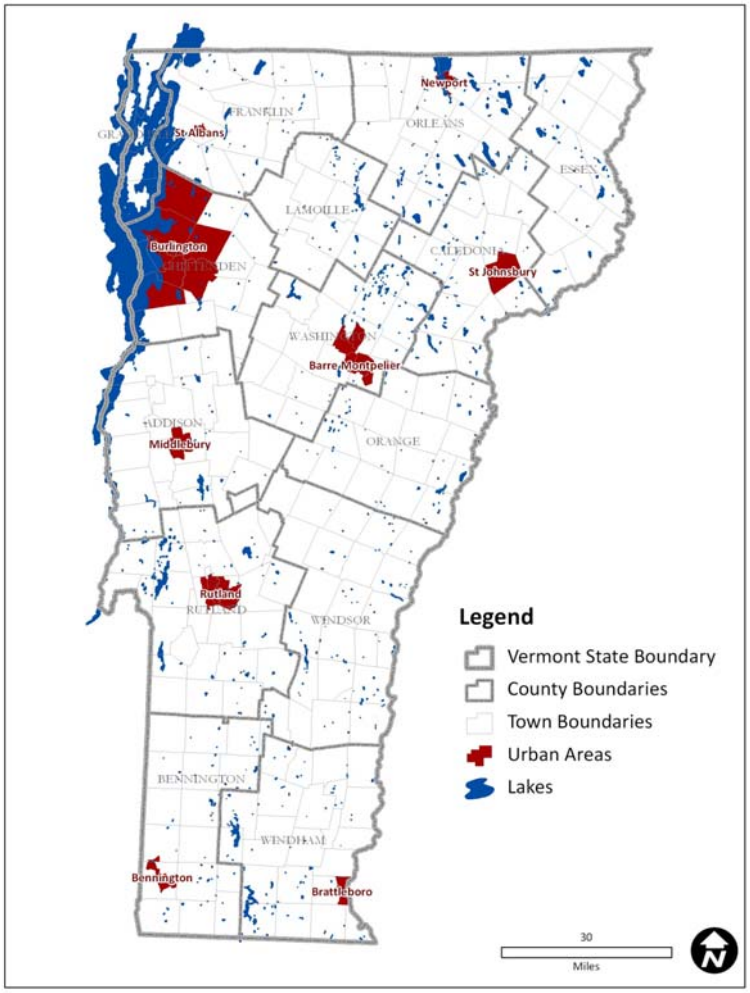

Figure 2. Map of Vermont showing Lakes, County and Town Boundaries, as well as the Urban Areas used in the calculations here.

Vermont's Remaining Undeveloped Lakeshores

Summary

This analysis used three separate GIS spatial datasets to delineate 100' long sections of lakeshores in Vermont that do not have built infrastructure within 250 feet. E911 data (including buildings and driveways) and VTrans Roads data were used determine which lakeshores were close to these types of development, and the remaining lakeshore in Vermont is designated here as "undeveloped". This undeveloped category does not include development that is not categorized in these datasets, such as agricultural fields.

It was found that Vermont's largest lakes receive the greatest amount of development (Table 1). For inland lakes (all Vermont lakes except for Champlain), lakes over 200 acres have only 51% of their shores undeveloped. This is a sharp contrast with Vermont's smallest lakes; lakes in the state that are between 10 and 20 acres still have 78% of their shorelines undeveloped. Taken together, the 1,039 miles of Vermont's inland lakeshores still have 639 miles of undeveloped shore (62%). The Vermont portion of Lake Champlain's shoreline (total 441 miles), only has 38% that remains undeveloped (169 miles).

Table 1. Remaining undeveloped Shorelines on Vermont Lakes

	Size (acres)	Total Shoreline in VT (miles)	Total Undeveloped Shoreline in VT (miles)	% Undeveloped Shoreline
Inland Lakes (All lakes except Champlain)	10-20	123	96	78%
	20-200	494	328	66%
	20+	916	543	59%
	200+	421	215	51%
	All VT Inland Lakes	1,039	639	62%
Lake Champlain		441	169	38%
All VT Lakes		1,480	808	55%

Data Sources

Data used to calculate built structures near lakes were obtained from GIS spatial analysis of three datasets: **Vermont E911**, **Vermont E911 Driveways**, and **VTrans Roads** (Fig. 1), which are all available from the Vermont Center for Geographic Information (vcgi.org). The E911 layer, which contains location and type information on

buildings and driveways in the state, was first published online December 7, 2012 and last updated on October 23, 2012. The VTrans Roads layer is a spatial dataset of roads in the state, and includes interstates, US and state highways, Class 1-4 town roads, national and state forest highways, private and military roads, and unimproved roads (noted in the dataset as "trails").

Analysis & Calculations

To select lakeshores that were close to structural development, features from each of three datasets described above that are near lakeshores were given a GIS 'radius' of 250 feet (Figure 1). The three spatial datasets were then combined, and shorelines of lakes intersected by these development 'radii' areas were removed (Figure 2). The remaining lakeshore is designated here as undeveloped (Figure 3). Any segment of lakeshore listed in this analysis as "undeveloped" does not have a structure, driveway or road within 250 feet.

Only lakeshores in Vermont are included here. For lakes that cross the state border, like Lake Memphremagog or Moore Reservoir, the non-Vermont portions of their shores were excluded.

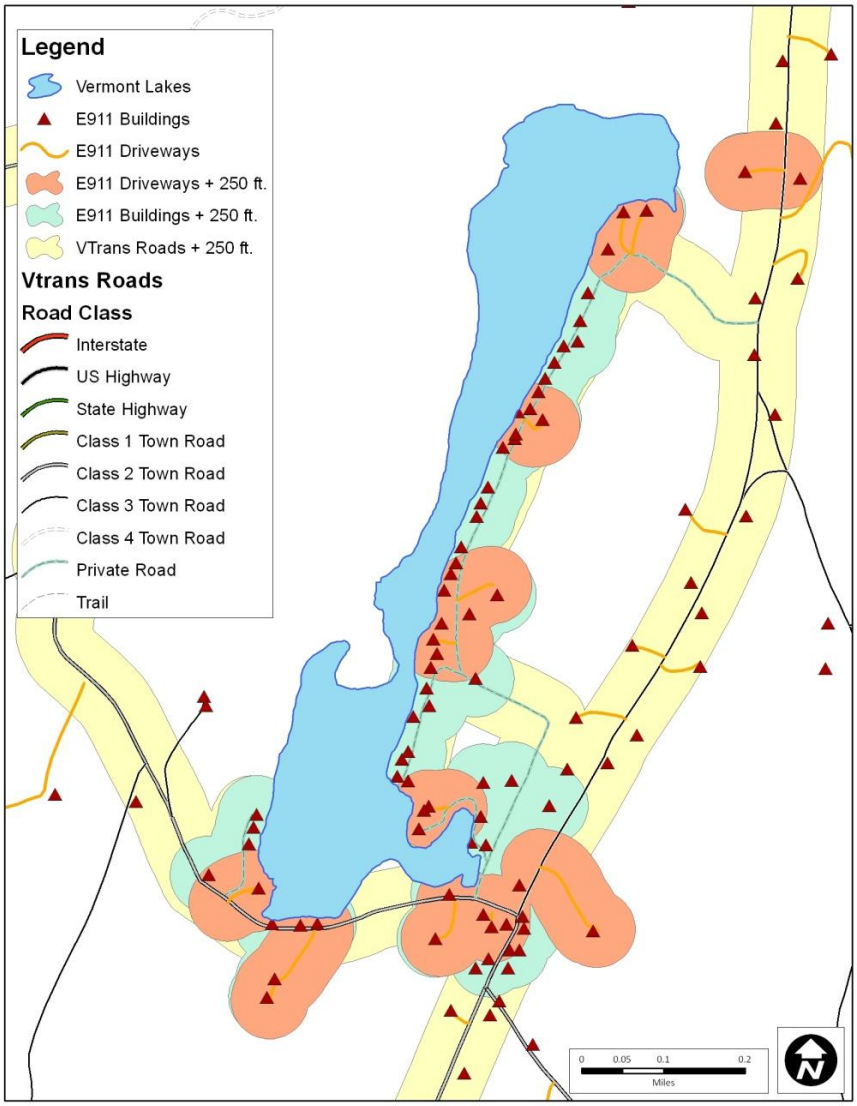

Figure 1. An additional 250 ft. was added to locations of buildings, driveways and roads located near lakes to determine the areas of impact near lakeshores.

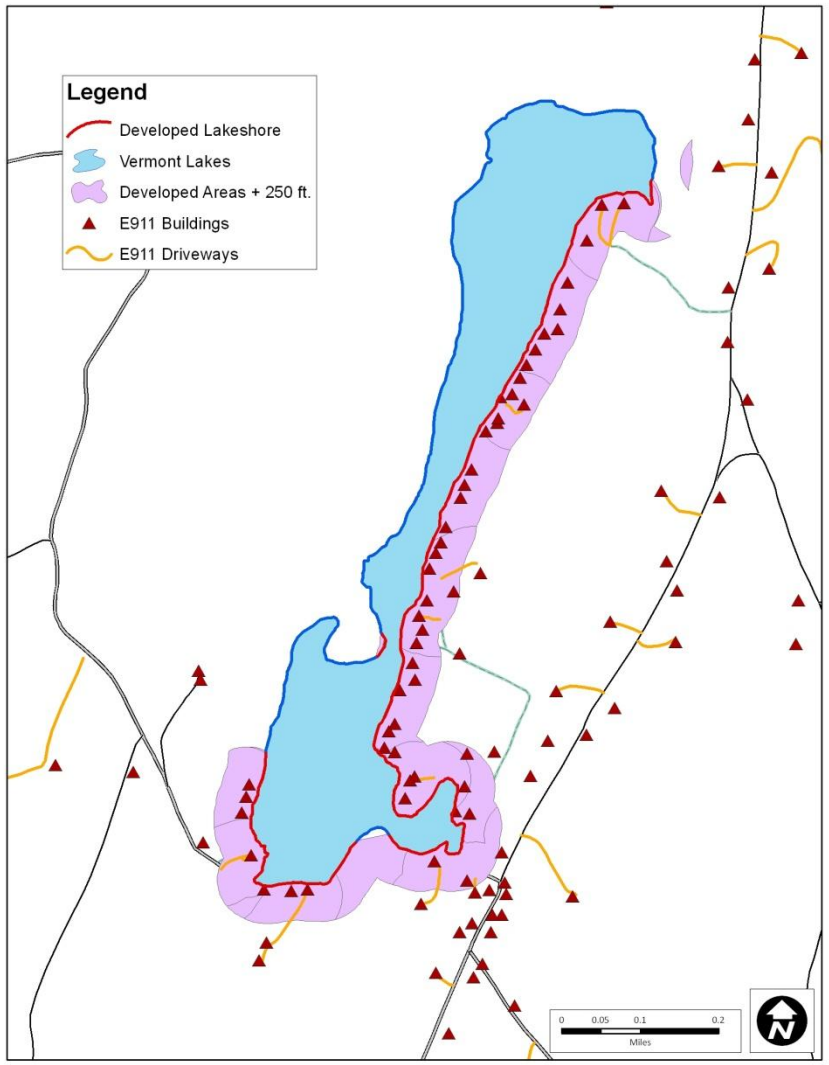

Figure 2. The sections of lakeshores that intersected with the developed areas (+ 250 ft. area of impact) were determined and labeled as "developed".

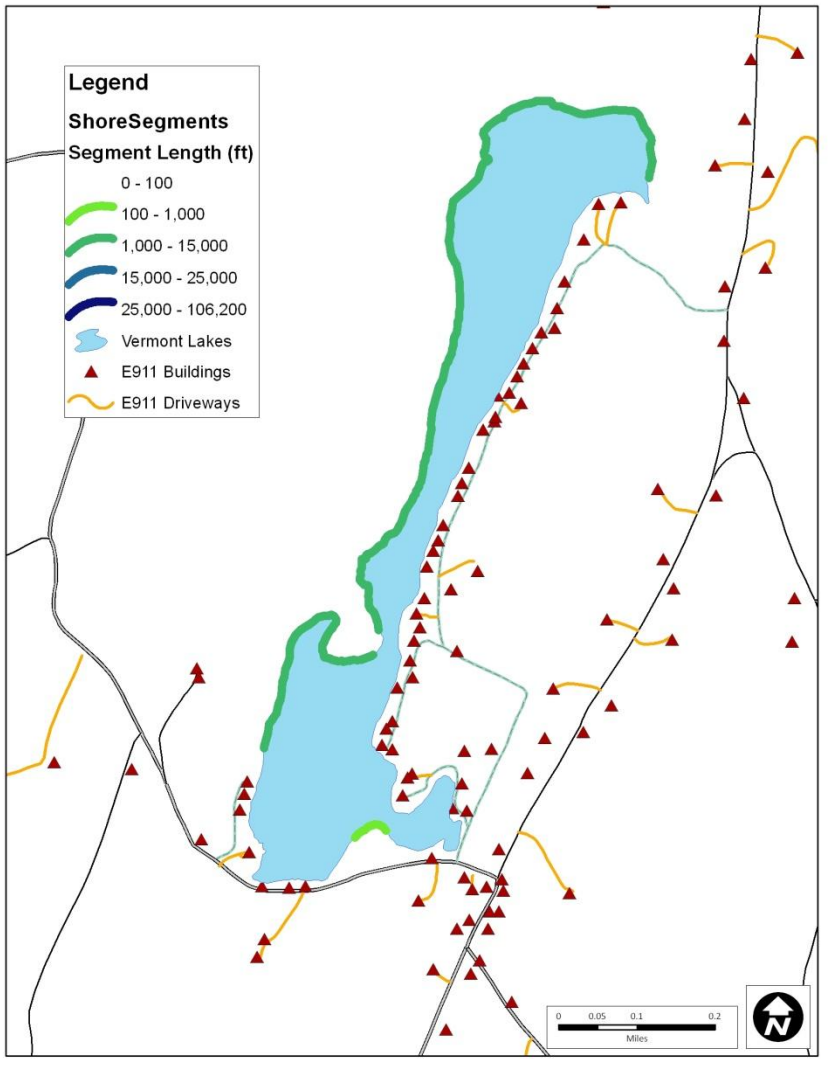

Figure 3. The length of the remaining, "undeveloped" lakeshores was measured. All segments less than 100 feet of shoreline were omitted from any future calculations. The remaining segments were sorted by length in order to prioritize longer segments.