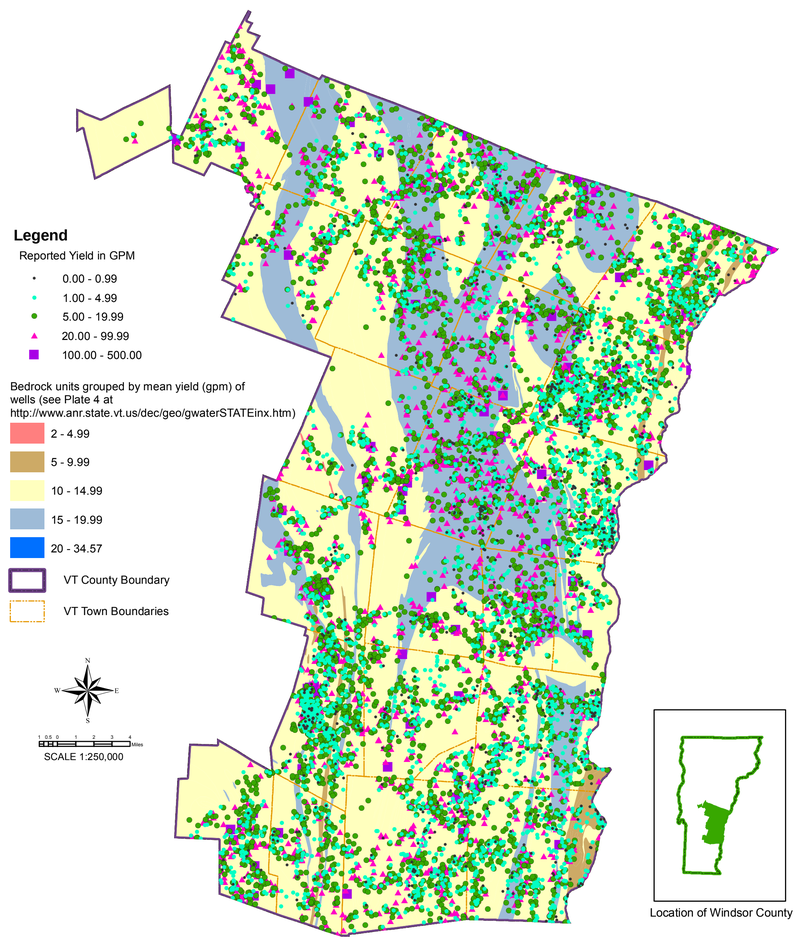

Figure 1. All Windsor County Bedrock Wells (points) and Bedrock Units Grouped by Yield. The map is the Windsor County portion (11,184 wells) of the statewide analyses of 92,315 wells. Map scale is 1:250,000. Refer to the statewide groundwater resource maps on the VGS web site for a discussion of this data and map. Web: http://www.anr.state.vt.us/dec/geo/gwaterSTATEinx.htm

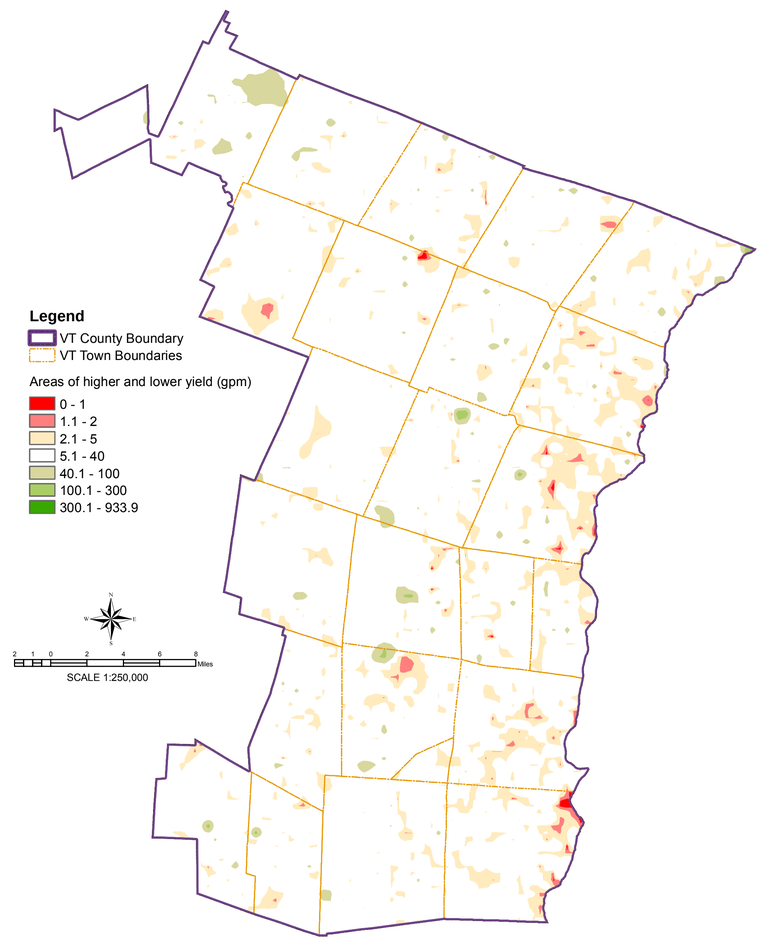

Figure 2. Areas of higher and lower yield based on an inverse distance weighted analysis of 92,315 well points. See maps at http://www.anr.state.vt.us/dec/geo/gwaterSTATEinx.htm
An inverse distance weighted analysis (IDW) is presented by county. The raster analysis is used to summarize values on the map. The raster statistics summarize attribute values of the well points and assigns a value to each cell in the layer. The IDW raster analysis was set to consider the closest 6 points. The raster shown here may be considered as an approximation of areas for additional study. The raster analysis does not attempt to provide a probabilistic analysis and it is only a presentation of clusters of values. These clusters will change with the addition of more data points.
Errors due to incorrect well locations are less significant at a scale of 1:250,000.

GROUNDWATER RESOURCES BY COUNTY

This county map is part of a map series used to evaluate Vermont's groundwater resources using existing data. The Windsor County maps show yield (gallons per minute) data for bedrock wells as reported in the VT DEC Water Supply Division database. A total of 92,315 wells in the State of Vermont were analyzed in the accompanying statewide study. Data were divided into counties for presentation (Figs. 1, 2). Well locations in the database are from well driller descriptions and sketches.

Some wells have been located by GPS or by correlating a well log to an E911 address. In Windsor County, 1460 out of 11,184 wells or 13% have an E911 or GPS address (Figure 3). The majority of wells, as shown on Figure 1, have suspect locations although errors due to incorrect well locations are less significant at a scale of 1:250,000.

Well yield (gpm) is generally estimated in the field with a bucket and timer. The time period is usually short and measurements are not meant to be precise. Comparisons of the mean and median values for all wells and the mean and median values for wells in Windsor County are shown in Table 1.

Wells are grouped into yield categories on the map presented here. Depth and yield vary due to many factors, including non-geologic factors. For example, a homeowner may drill until the desired yield is obtained. The factors are not indicative of capacity. Moore et. al., 2002*, published "Factors Related to Well Yield in the Fractured-Bedrock Aquifer of the New Hampshire" in which they discussed a number of factors correlated positively or negatively to well yield. Among these factors are year drilled, median household income, drilling method, up gradient drainage area, thickness of overburden, depth drilled, proximity to streams/water bodies, type of bedrock, steepness of slope, elevation, fractures, and geologic structures.

The map presented is designed to be used in conjunction with other data and analyses. Groundwater flow in the crystalline bedrock of Vermont is mainly along planar features such as fractures, cleavage, faults, and bedding. These planar features may be interconnected and groundwater flow within this system is complex.
*Area-specific studies in the county have been completed for the Town of Woodstock and are posted on the web at: Web: http://www.anr.state.vt.us/dec/geo/grndwaterinx.htm

* 1. Thompson, P. J., 2006, Bedrock Geologic Map of Woodstock, Vermont: Vermont Geological Survey Open File Report VG06-4, 4 color plates, scale 1:24,000.
2. DeSimone, D., 2006, Surficial Geologic Map and Groundwater Resources of Woodstock, Vermont,Vermont Geological Survey Open File Report VG06-5, 6 color plates, scale 1:24000.
3. Becker, L., De Simone, D., Thompson, P. and Gale, M., 2007, Groundwater Resources of Woodstock, Vermont: NEGSA Abstract with programs - poster on line at: http://www.anr.state.vt.us/dec/geo/WoodstockWater.htm
3. Moore, R.B., Schwarz, G.E., Clark, S.F., Jr., Walsh, G.J., and Degnan, J. R., 2002, Factors related to well yield in the fractured-bedrock aquifer of New Hampshire: USGS Professional Paper 1660.

TABLE 1

	State of Vermont	Windsor County
# of wells	92315	11,184
# of located wells	15389	1460
Mean yield, GPM	13.76	12
Median yield	6	6
Maximum reported yield	1200	500
Standard Deviation	23	18
Mean depth, FT	293	300
Median depth, FT	260	271
Maximum reported depth	1765	1480
Standard deviation	158	155
% wells with yield ≤ mean	70%	7919/11,184 or 71%
% wells with yield > mean	30%	3265/11,184 or 29%
% wells with depth ≤ mean	56%	6721/11,184 or 60%
% wells with depth > mean	44%	4463/11,184 or 40%

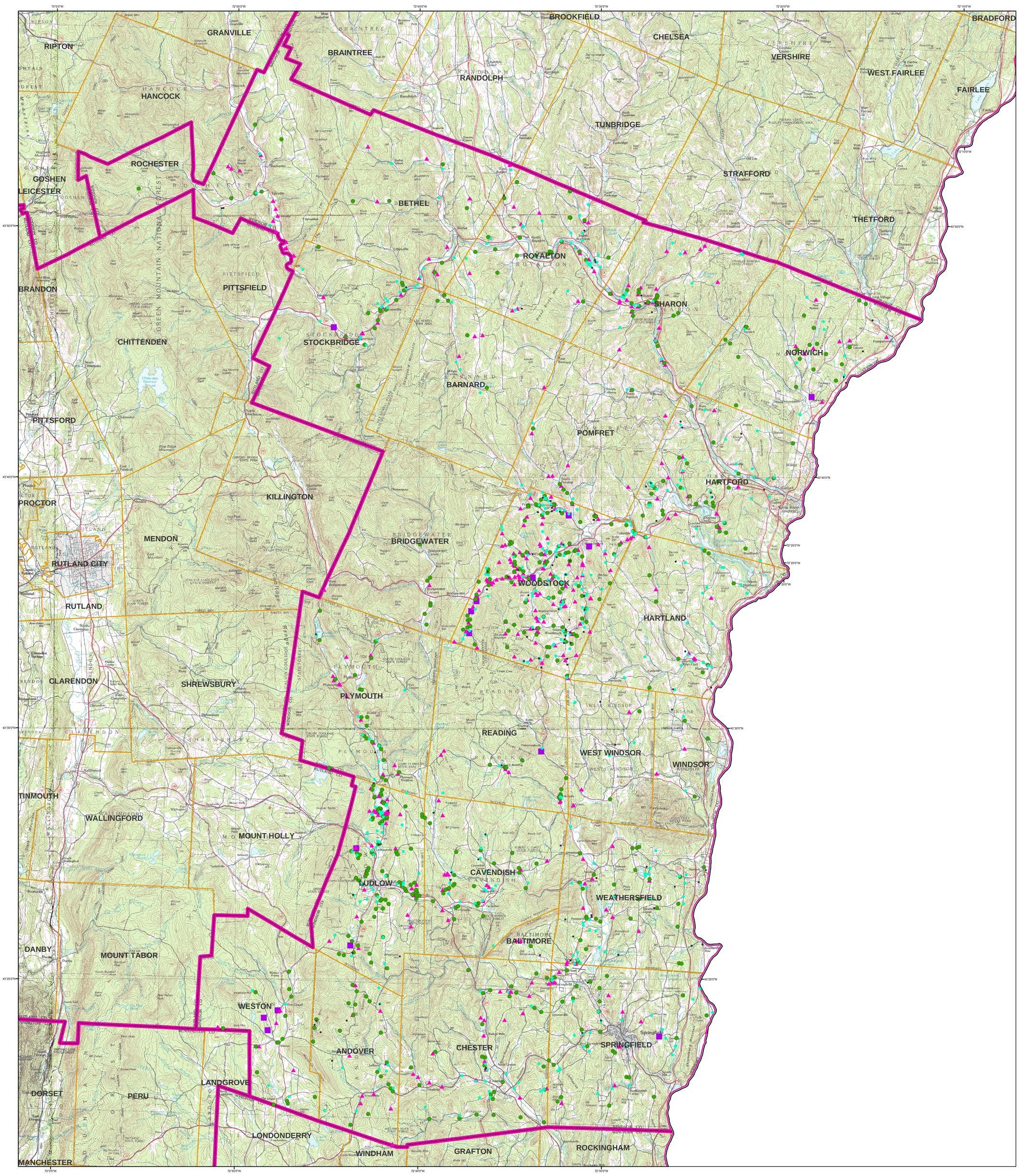

Figure 3. Windsor County Bedrock Wells with E911 or GPS Location

Legend

Reported yield in gallons per minute (GPM)
0.00 - 0.99
1.00 - 4.99
5.00 - 19.99
20.00 - 99.99
100.00 - 500.00

Roads

Water
VT Town Boundaries
VT County Boundary

0 0.5 1 2 3 4
Miles
SCALE: 1:100,000

Reported Well Yields in Bedrock Wells, Windsor County, Vermont

by
Marjorie Gale, George Springston, Ryan Knox and Laurence Becker
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