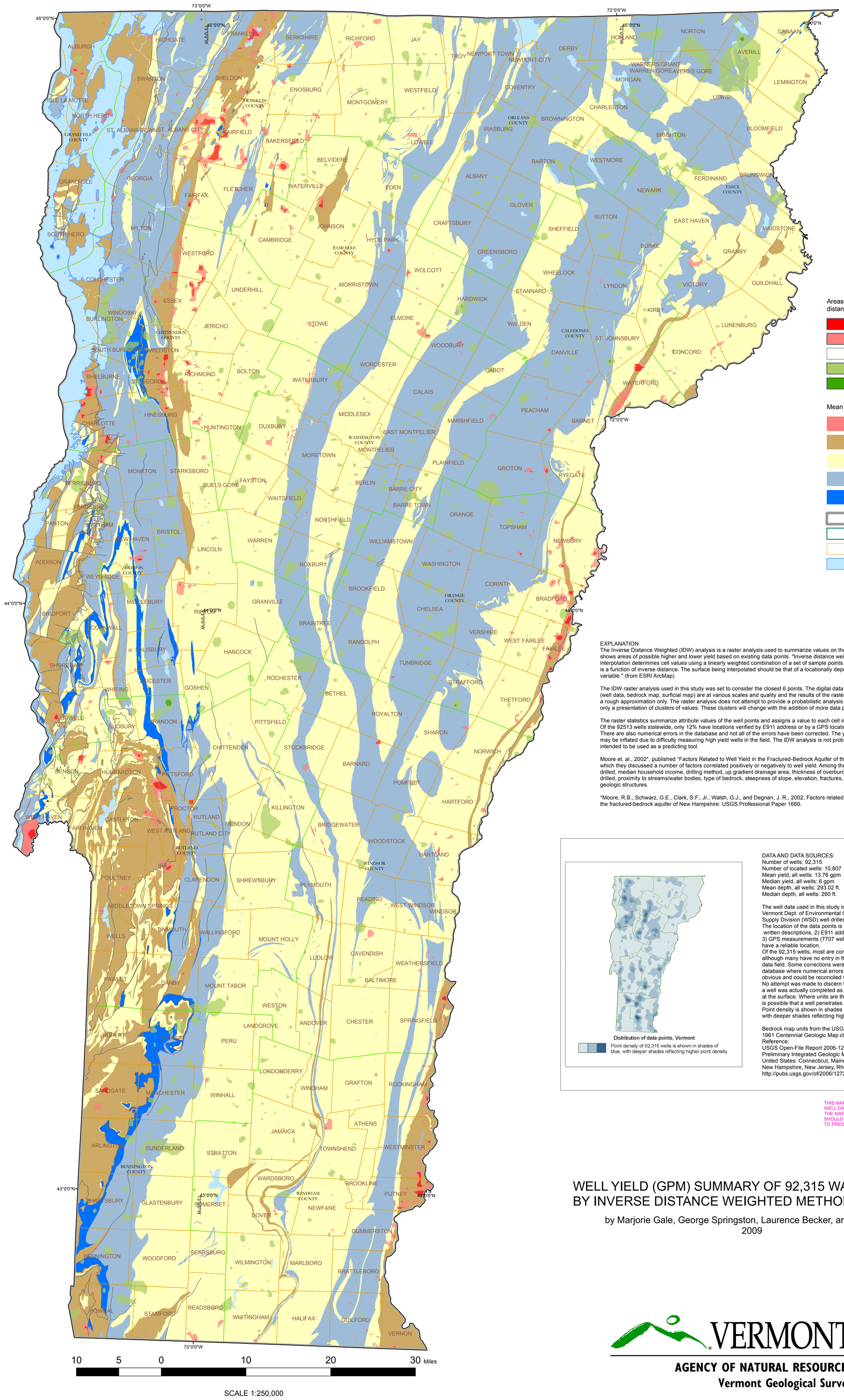

N
W E
S

Legend

Areas of lower and higher yield based on an inverse distance weighted analysis of 92315 well points.

- 0 - 1
- 1.1 - 2
- 2.1 - 40; no color
- 40.1 - 300
- 300.1 - 933.9

Mean yield of wells by bedrock unit (see Plate 4)

- 2 - 4.99 gpm
- 5 - 9.99 gpm
- 10 - 14.99 gpm
- 15 - 19.00 gpm
- 20 - 34.57 gpm

- VT State Boundary
- VT County Boundary
- VT Town Boundary
- Lake

EXPLANATION
The Inverse Distance Weighted (IDW) analysis is a raster analysis used to summarize values on the map. The analysis shows areas of possible higher and lower yield based on existing data points. "Inverse distance weighted (IDW) interpolation determines cell values using a linearly weighted combination of a set of sample points. The weight is a function of inverse distance. The surface being interpolated should be that of a locationally dependent variable." (from ESRI ArcMap)

The IDW raster analysis used in this study was set to consider the closest 6 points. The digital data and original data (well data, bedrock map, surficial map) are at various scales and quality and the results of the raster analysis are a rough approximation only. 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.

The raster statistics summarize attribute values of the well points and assigns a value to each cell in the layer. Of the 92513 wells statewide, only 12% have locations verified by E911 address or by a GPS location. There are also numerical errors in the database and not all of the errors have been corrected. The yield values may be inflated due to difficulty measuring high yield wells in the field. The IDW analysis is not probabilistic and is not intended to be used as a predicting tool.

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.

*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.

Distribution of data points, Vermont

Point density of 92,315 wells is shown in shades of blue, with deeper shades reflecting higher point density.

DATA AND DATA SOURCES:
Number of wells: 92,315
Number of located wells: 10,807
Mean yield, all wells: 13.76 gpm
Median yield, all wells: 6 gpm
Mean depth, all wells: 293.02 ft.
Median depth, all wells: 260 ft.

The well data used in this study is a derivative set of the Vermont Dept. of Environmental Conservation Water Supply Division (WSD) well driller database.
The location of the data points is from 1) well driller maps and written descriptions, 2) E911 addresses (3100 wells), and 3) GPS measurements (7707 wells). Only 12% of the wells have a reliable location.
Of the 92,315 wells, most are completed in bedrock, although many have no entry in the "well type" data field. Some corrections were made to the database where numerical errors were obvious and could be reconciled with a driller report.
No attempt was made to discern the rock type in which a well was actually completed as compared to the rock type at the surface. Where units are thin and shallow dipping, it is possible that a well penetrates one or more formations.
Point density is shown in shades of blue, with deeper shades reflecting higher point density.

Bedrock map units from the USGS digital data from the 1961 Centennial Geologic Map of Vermont, scale 1:250,000.
Reference:
USGS Open-File Report 2006-1272
Preliminary Integrated Geologic Map Databases for the United States: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, Rhode Island and Vermont
http://pubs.usgs.gov/of/2006/1272/

THIS MAP IS A SUMMARY OF WATER WELL DATA AND BEDROCK GEOLOGIC UNIT. THE MAP IS NOT PROBABALISTIC AND SHOULD NOT BE USED ALONE TO PREDICT YIELD OR DEPTH.

WELL YIELD (GPM) SUMMARY OF 92,315 WATER WELLS BY INVERSE DISTANCE WEIGHTED METHOD, VERMONT

by Marjorie Gale, George Springston, Laurence Becker, and Ryan Knox
2009

VERMONT
AGENCY OF NATURAL RESOURCES
Vermont Geological Survey

Published by:
VT Geological Survey, L. Becker, State Geologist
VT Dept. of Environmental Conservation
VT Agency of Natural Resources
103 South Main St., Logue Cottage
Waterbury, VT 05671-2420
http://www.anr.state.vt.us/dec/geo/vgs.htm
802.241.3608