

## Climate and other site factors for vineyard development

Climate is an important factor in choosing a site for vineyard development. To guide in site selection, maps of several important agroclimatological factors were created based on 50 years of weather data. Daily weather data were collected from the National Oceanic and Atmospheric Administration's Summary of the Day series (NOAA, 1952-2001) from 83 sites across the state of Michigan. Continuous spatial estimates of the variables were interpolated using the spline method, which assumes a minimum curvature between nearby points.

*Note that most of the weather stations in the analysis are not located in sites considered suitable for a vineyard and that the micro- and meso- climate of a specific vineyard site can be important factors in its success or failure. There may be suitable sites in areas generally noted as unfavorable; for these sites, local topographic factors are even more critical. These maps are for general planning purposes and should not be interpreted as a guarantee of suitability.*

### Climate maps

- Page 2 Growing season length
- Page 3 Growing season heat accumulation
- Page 4 Winter injury

### Maps of non-climatic factors

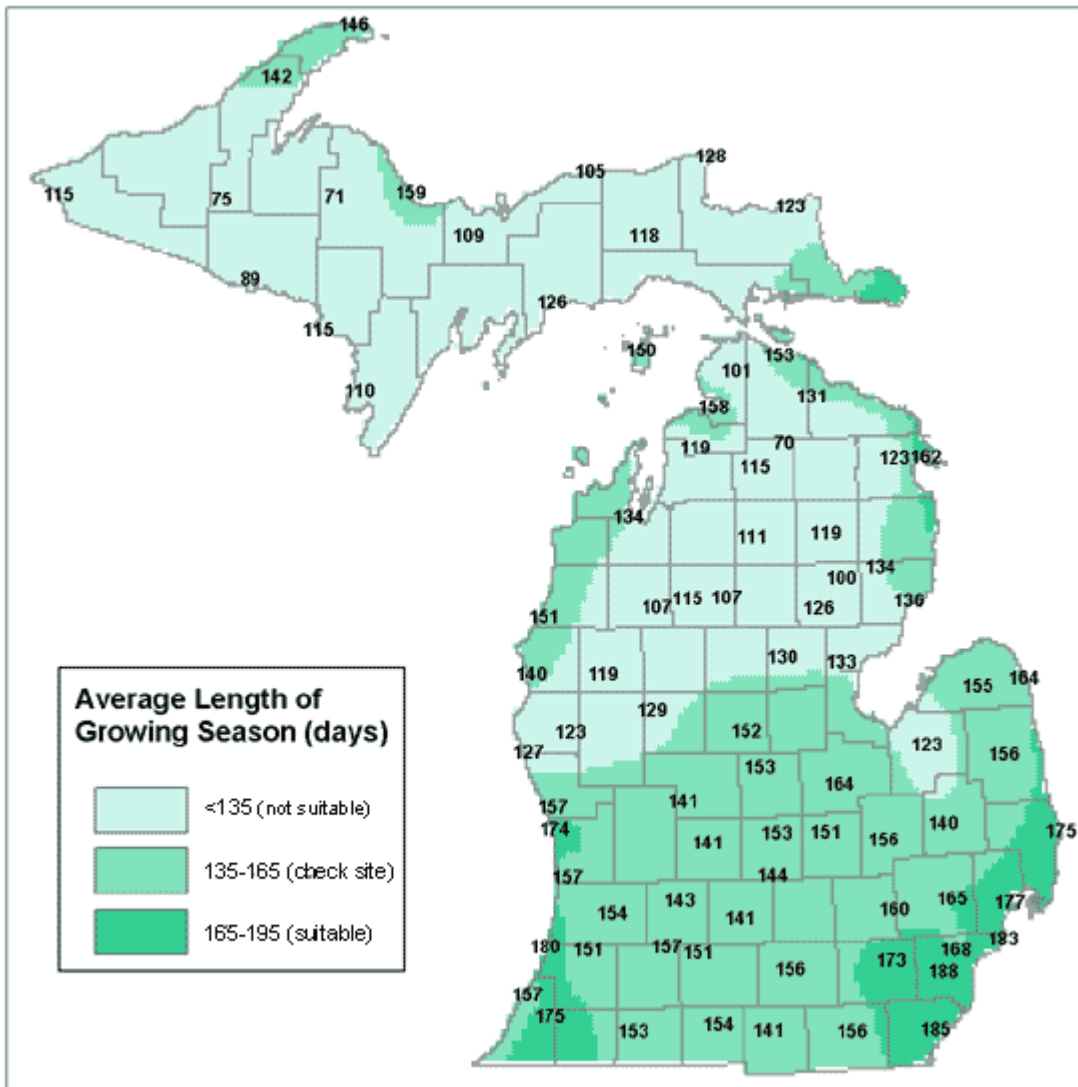
- Page 5 Local relief – topography
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**Additional information** about some of the climate topics covered in this document is available in Michigan State University Extension Bulletin E-2644, *Vineyard Establishment 1*, which can be ordered through MSU Extension by calling 517-353-6740 or on the Internet at: <http://www.emdc.msue.msu.edu/>

For more information on Michigan climate, contact Dr. Jeff Andresen, State Climatologist, Michigan Climatological Resources Program, Michigan State University Department of Geography, at 517-355-0231x107. For specific data requests, contact Peter Kurtz at 517-355-0231x104.

For more information about business opportunities in Michigan's wine industry, please contact Linda Jones at the Michigan Grape and Wine Industry Council 517 373-9789.

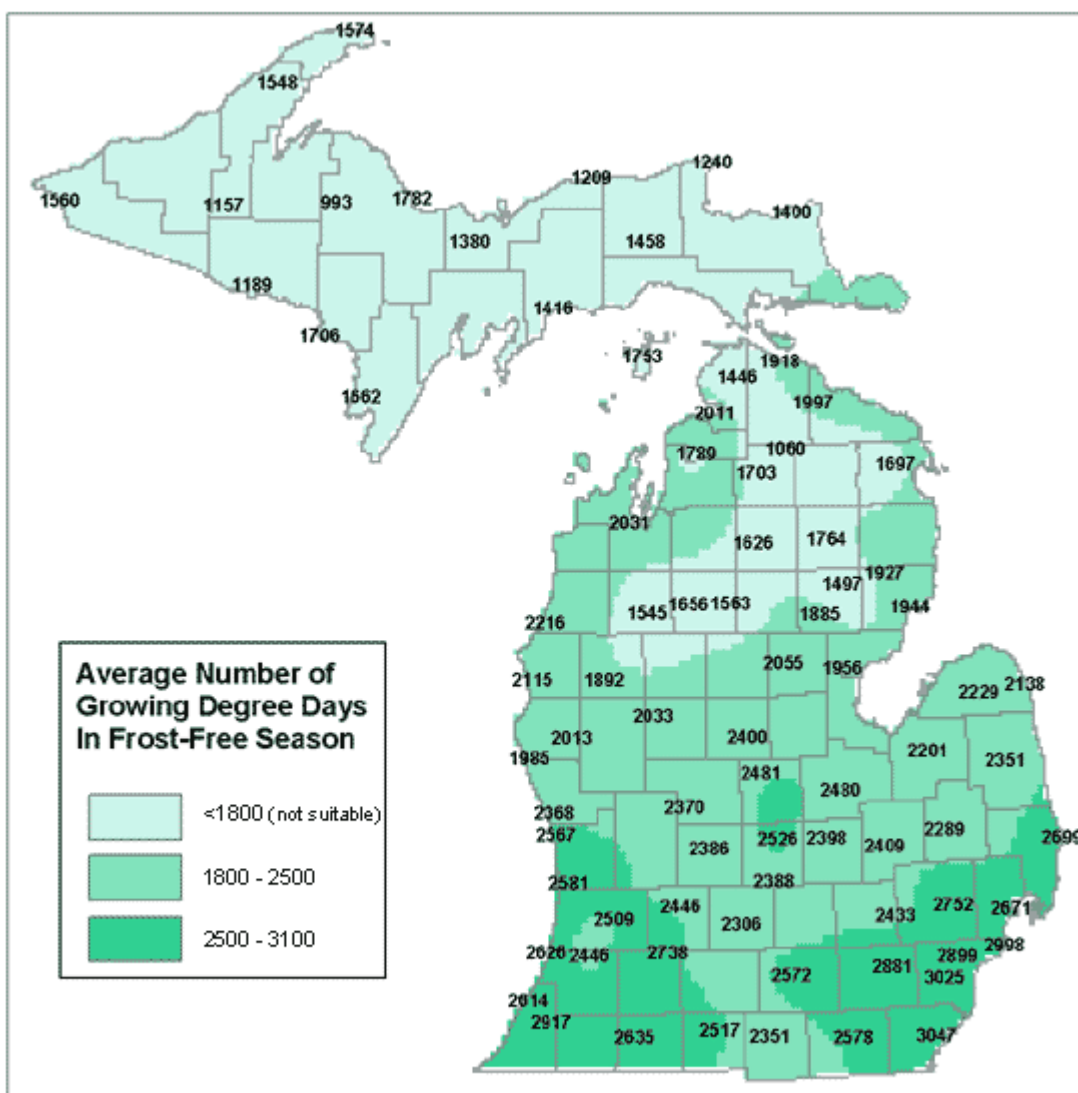
This information was developed at Michigan State University with funding from a Julian-Stille Value-Added Grant from the Michigan Department of Agriculture to develop Wine Industry Resource Materials for Michigan.



### Growing Season Length

Most grape varieties need a growing season of at least 165 days defined by the number of days between the date of the last freezing temperatures (0C or lower) in the spring and the first freezing temperatures in the following fall season. (Note: August 1<sup>st</sup> is arbitrarily set as the first day of the fall season.) This map illustrates patterns in growing season length across the state, with maximum values in the southwestern and southeastern corners of the Lower Peninsula and minimum values in interior areas of the northern Lower Peninsula and western Upper Peninsula. Specific sites in the region will have longer or shorter growing seasons based on micro- and mesoclimate. (More information in Extension Bulletin E-2644, *Vineyard Establishment 1*)

Data and maps prepared by Aaron Pollyea, Peter Kurtz, and Tracy Aichele, Michigan Climatological Resources Program, Michigan State University Department of Geography, based on data from the National Oceanic and Atmospheric Administration Summary of the Day series (NOAA, 1952-2001).



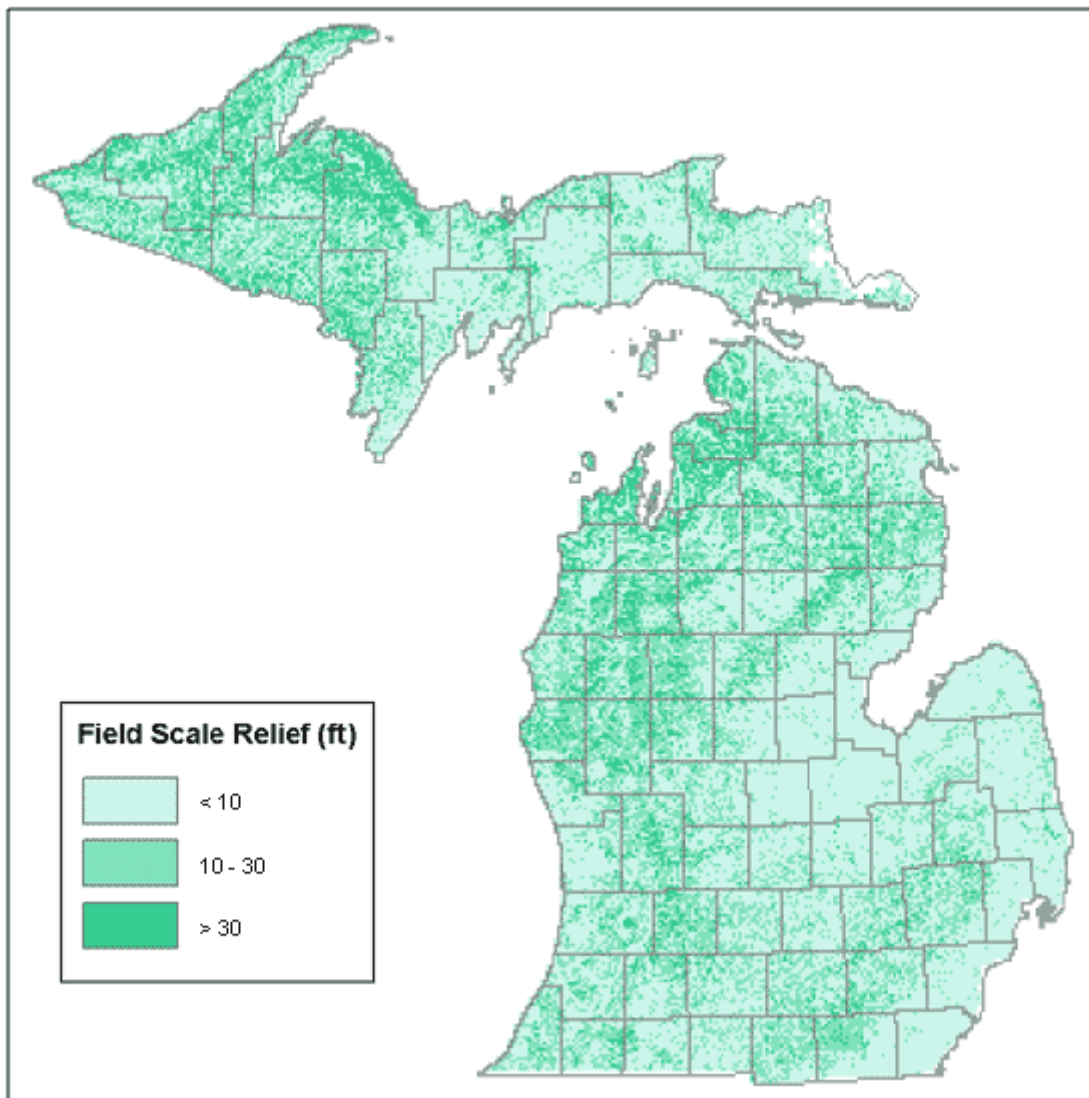
### Growing Season Heat Accumulation

In-season crop development is governed by the magnitude and rate of heat accumulation, described by Growing Degree Days (GDD). In this figure, the numbers given are the mean number of base 50°F GDDs accumulated between the last freezing temperatures of the spring and the first freezing temperatures of the fall. Grape varieties have different GDD requirements for full ripening. Sites may have greater or fewer GDD than this map suggests based on micro- and mesoclimatic variables. (More information in Extension Bulletin E-2644, *Vineyard Establishment 1*) (Note: the totals in this figure are calculated using Baskerville-Emin, base 50 GDD)

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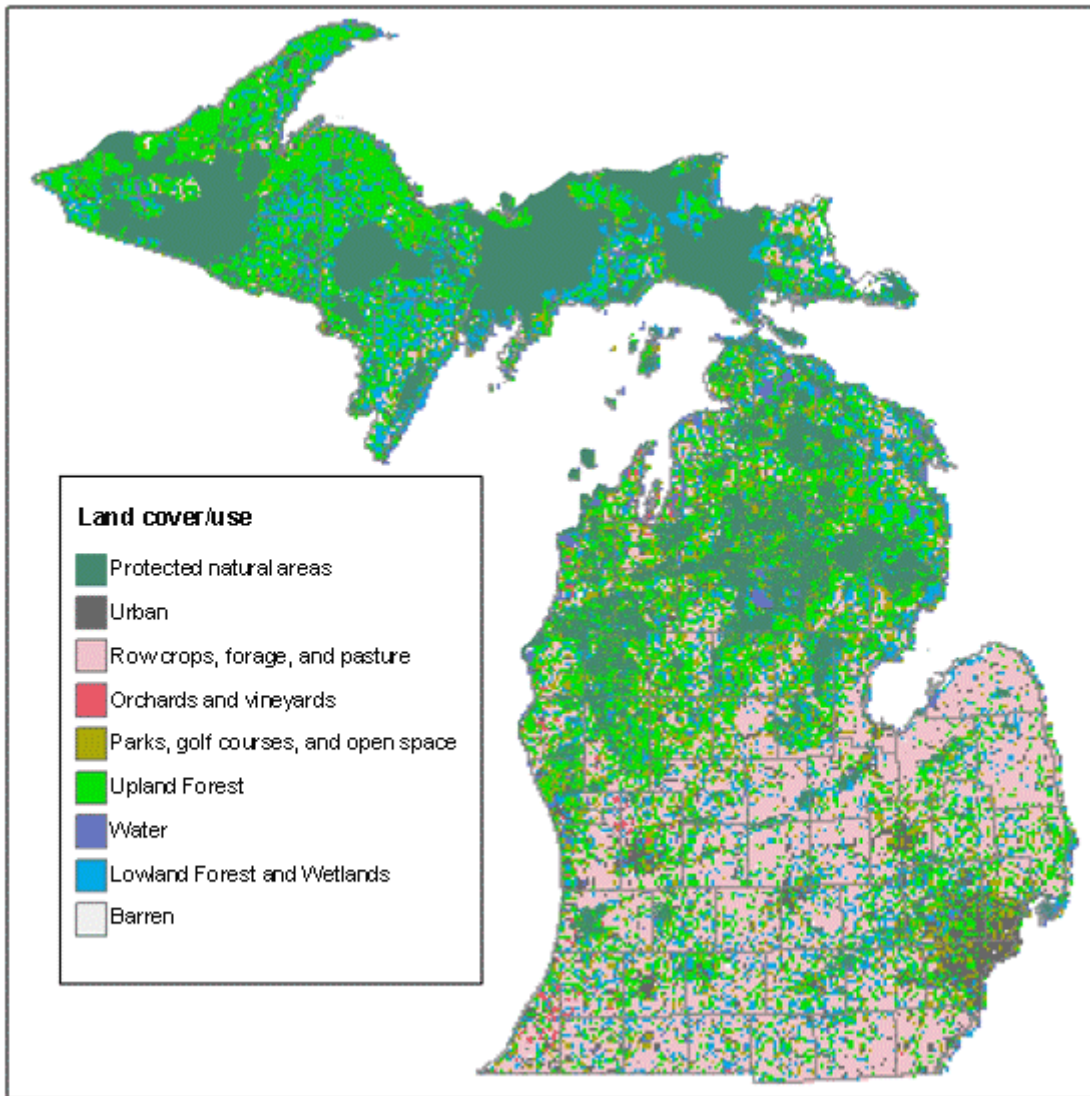
## Maps of other site factors



### Local Relief

Topography plays a role in the mesoclimate of a vineyard. For example, south- and west-facing slopes receive more sunlight than north- and east-facing slopes, and thus may be relatively warmer. Topographic relief is important for cold-air drainage from a vineyard; during relatively clear calm conditions and radiation cooling (the type of conditions most frequently associated with abnormally cold temperatures), cold air sinks and flows from higher elevations to lower elevations, eventually accumulating in troughs or valleys and leaving the hilltop and hillsides warmer. Flat sites are at a disadvantage in this respect and may remain colder than nearby slopes. In this map, darker green indicates areas with higher local relief which may have better potential for vineyard development.

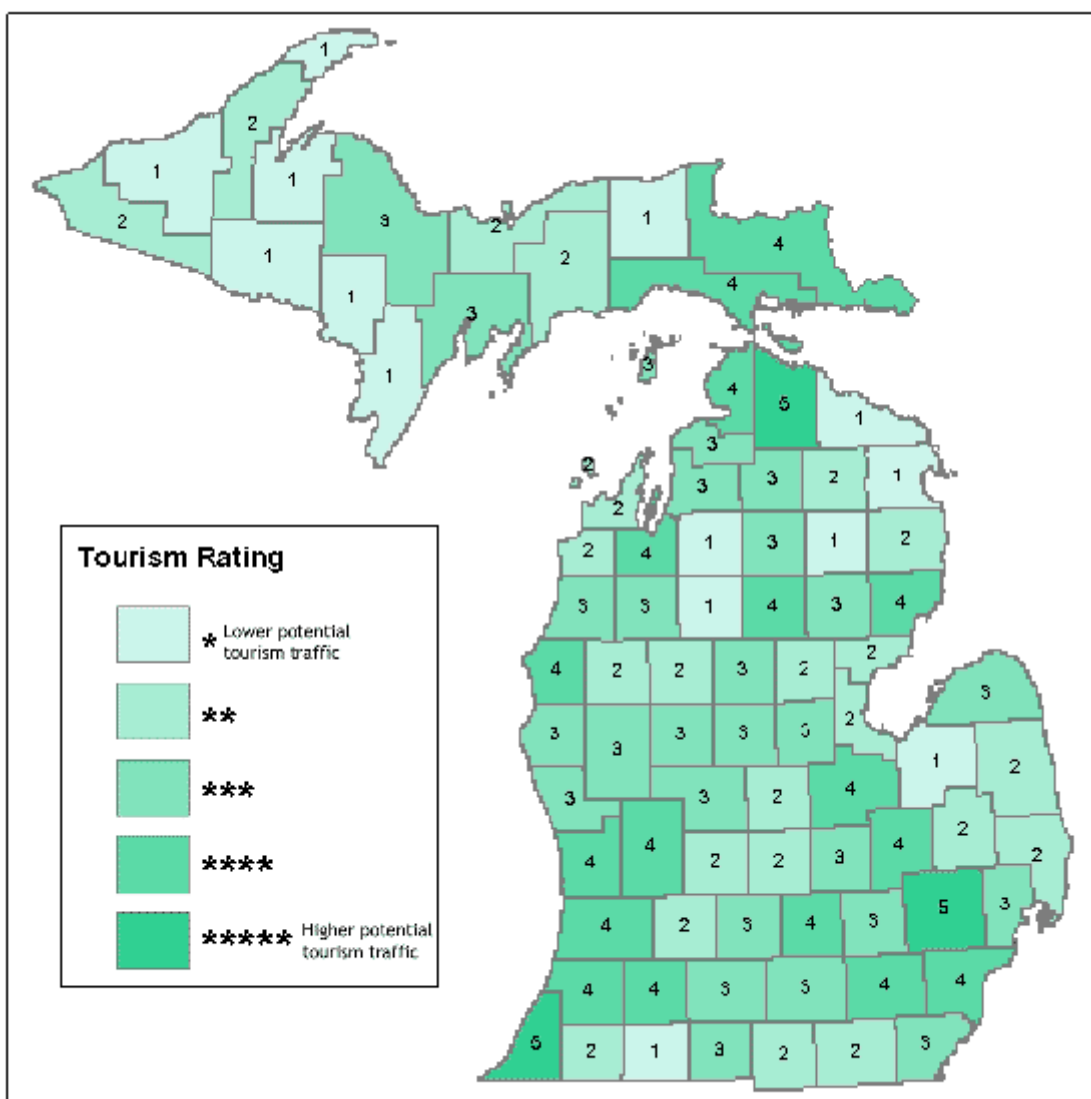
Prepared by Tracy Aichele, Michigan Climatological Resources Program, Michigan State University Department of Geography, based on data from the United State Geological Survey National Elevation Database.



### **Current Land Use**

Some areas will not be suitable sites for a vineyard because of current land use or land ownership. This map should serve as a guide to areas that might be available for vineyard development.

Prepared by Tracy Aichele, Michigan Climatological Resources Program, Michigan State University Department of Geography, based on data from the Michigan Department of Natural Resources, Forest, Mineral and Fire Management Division, IFMAP/GAP Land Cover (circa 1997 - 2001).



### Tourism

Although tourism is not important to siting a vineyard, it is critical to the development of wineries with tasting rooms. In this map, high values indicate high tourism traffic. Wineries in these areas may benefit from the current tourism market. These ratings were developed by the MSU Travel, Tourism and Recreation Resources Center based on the percent of tourism market share, the number of vehicle miles traveled and the number of campsites, lodging rooms, and second homes.

Data prepared by Lori A. Martin, Travel, Tourism & Recreation Resource Center, Michigan State University. Map prepared by Tracy Aichele, Michigan Climatological Resources Program, Michigan State University Department of Geography.