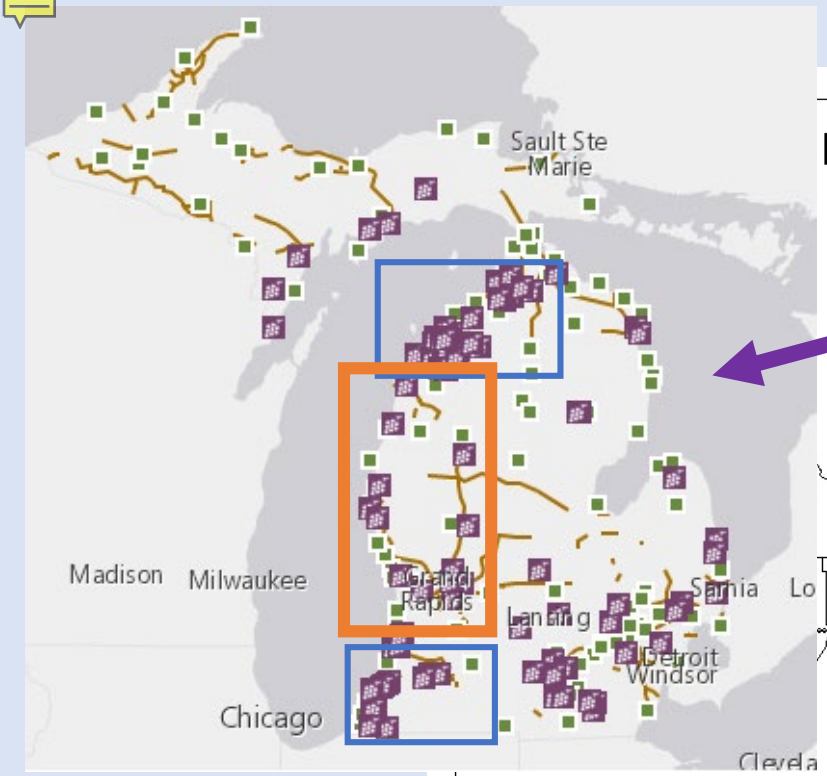
Suitability & Challenges of Growing Wine Grapes in Cool Climate Regions of Michigan

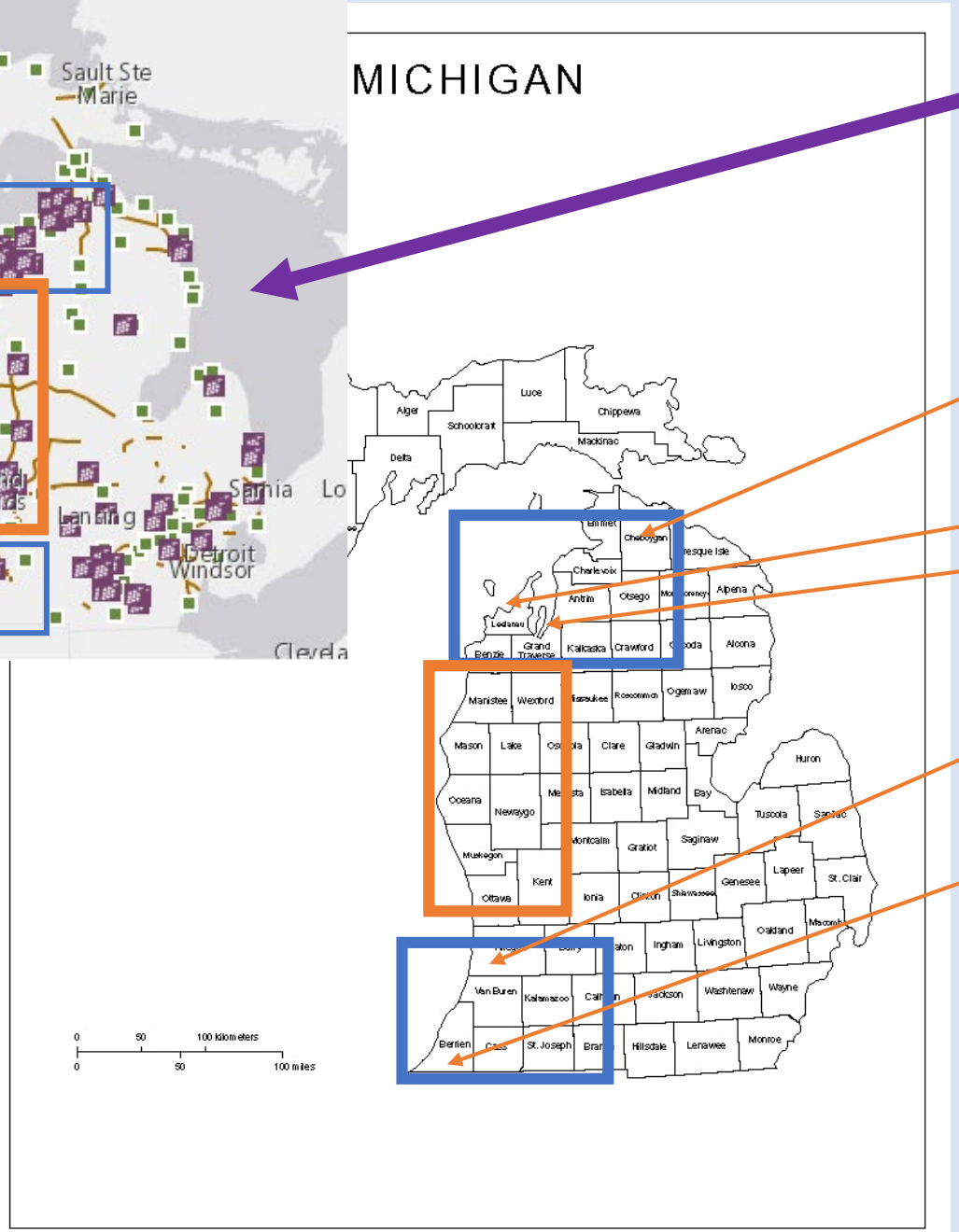
Adrienne Stone

Advanced Project

Winter 2018

DePaul University

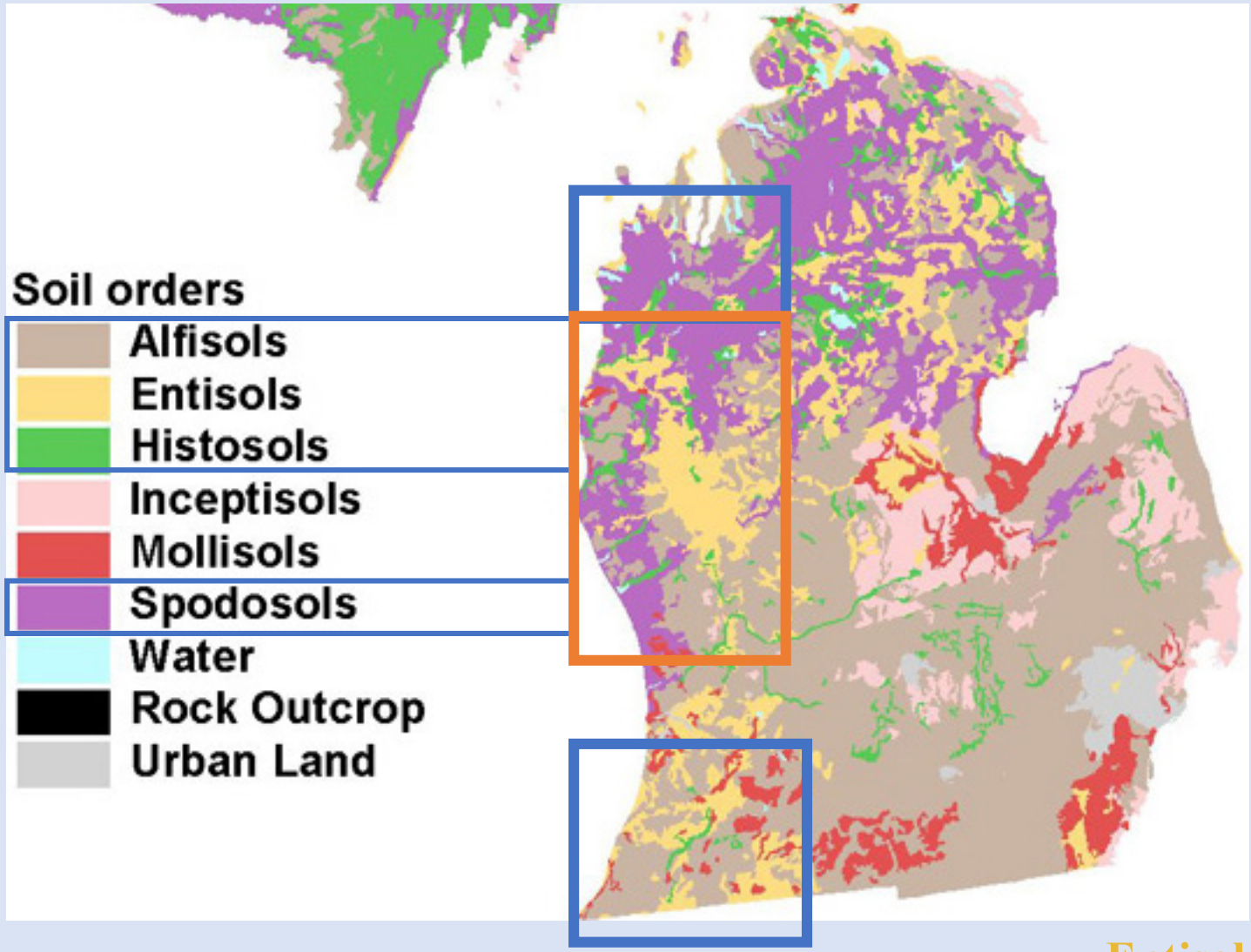




Existing Michigan Wineries

Current American Viticultural Areas & their primary cultivars

- *Tip of the Mitt*
  - Frontenac Gris, La Crescent, Marquette
- *Leelanau, Old Mission Peninsula*
  - Cabernet Franc, Chardonnay, Gewurtztraminer, Merlot, Pinot Gris, Pinot Noir, Riesling
- *Fennville, Lake Michigan Shore*
  - Cabernet Franc, Cabernet Sauvignon, Chardonnay, Gewurtztraminer, Lemberger, Malbec, Marsanne, Merlot, Müller Thurgau, Pinot Gris, Pinot Noir, Riesling, Roussanne, Syrah, Vignoles, Viognier



Spodosols

- Occur under coniferous forests in humid regions
- Acidic and infertile
- Result of weathering
  - Add Al or Fe into subsoil

Alfisols

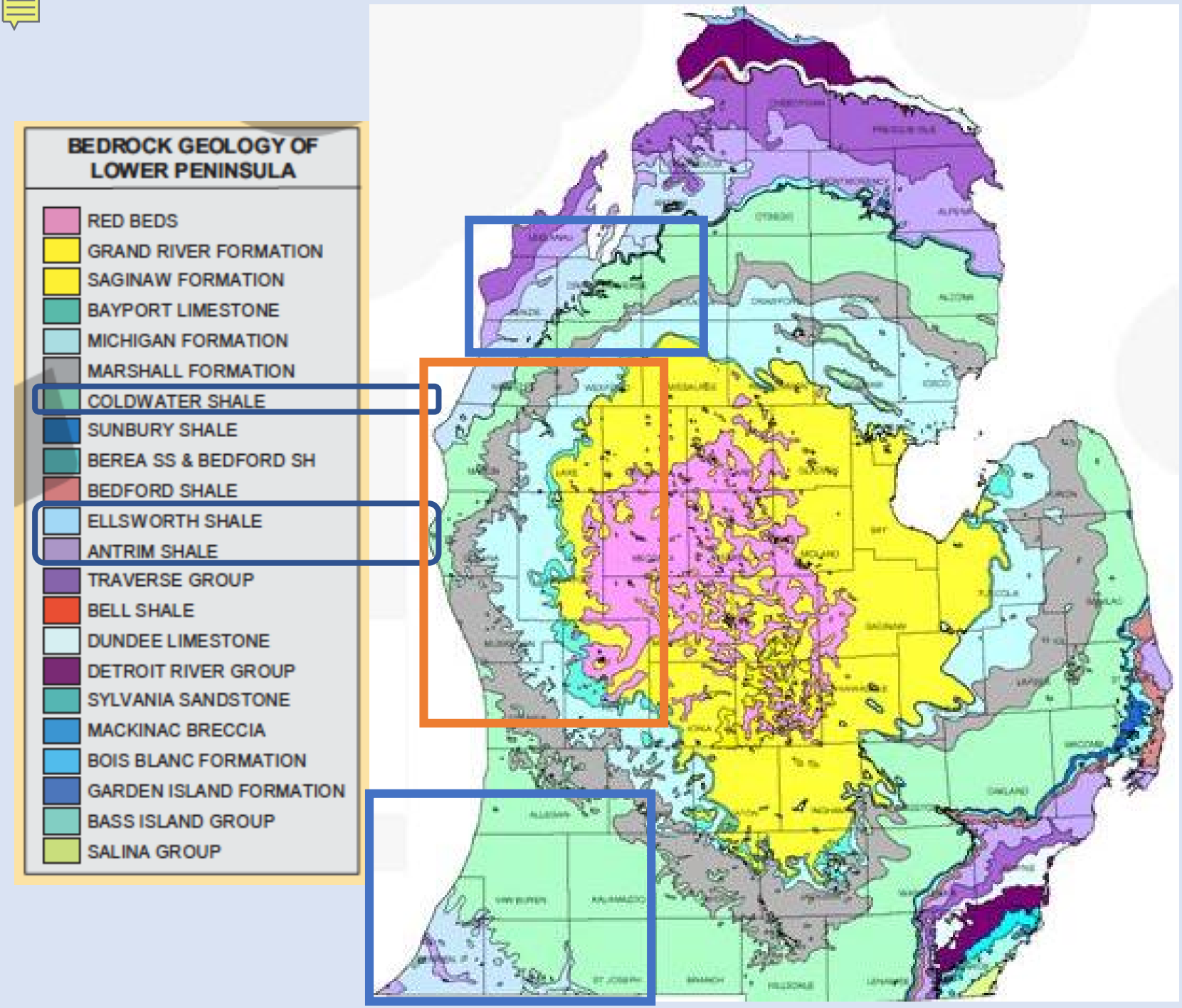
- Occur in semi-arid to moist areas
- Formed primarily under forest or mixed vegetative cover
- Productive for most crops
- Hold & supply moisture and nutrients

Histosols

- High water retention
- High organic matter content

Entisols

- Occur in sloped environments and dunes



Coldwater Shale

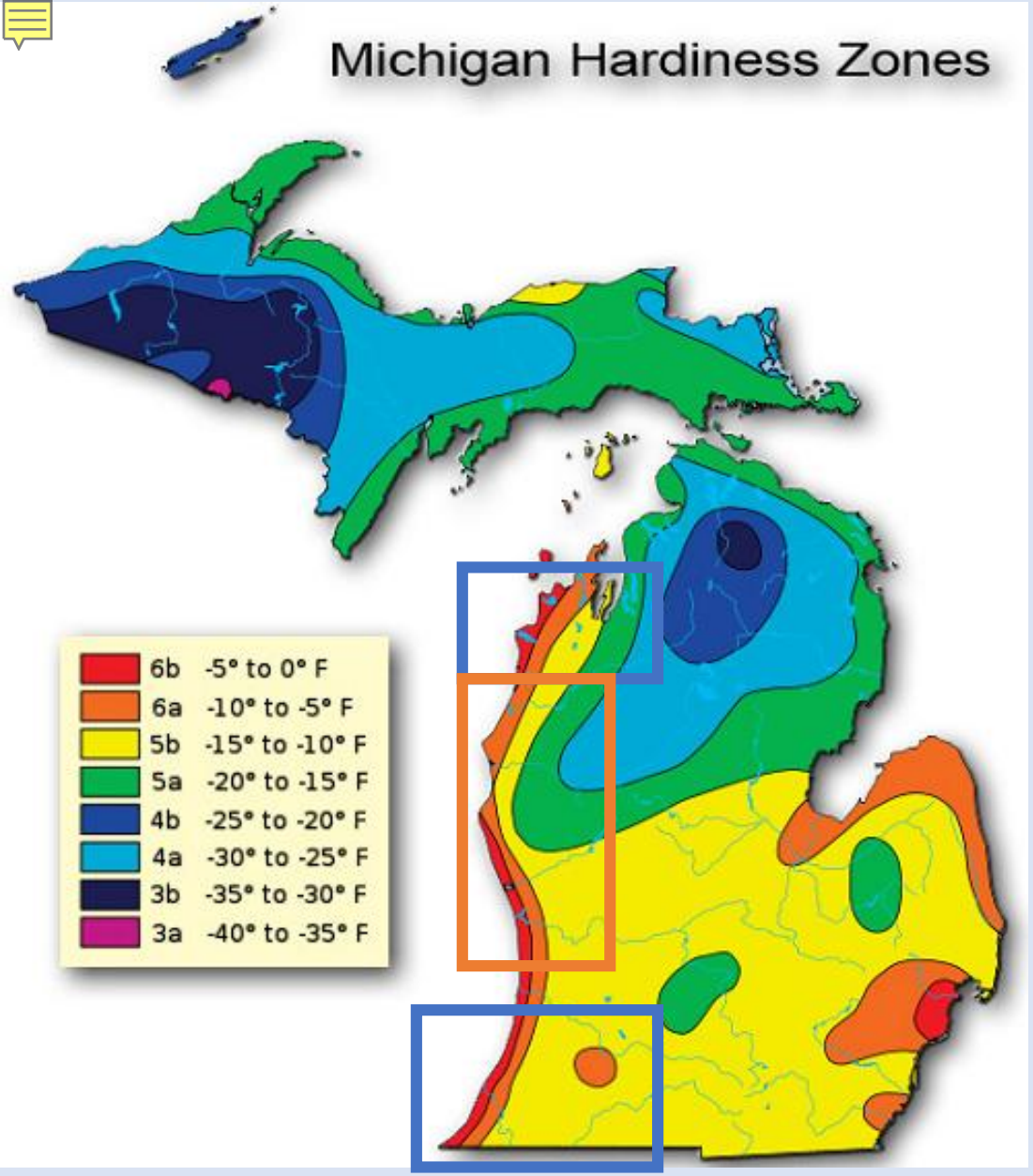
- Based in shale and limestone
- Fossil preserved from Osseous period

Ellsworth Shale

- Silty Loam
- 35-45% Clay
- Limestone
- Moderate Drainage

Antrim Shale

- Highly laminated
- Organic matter content 1-20%
- Fine grain sandstone at the base



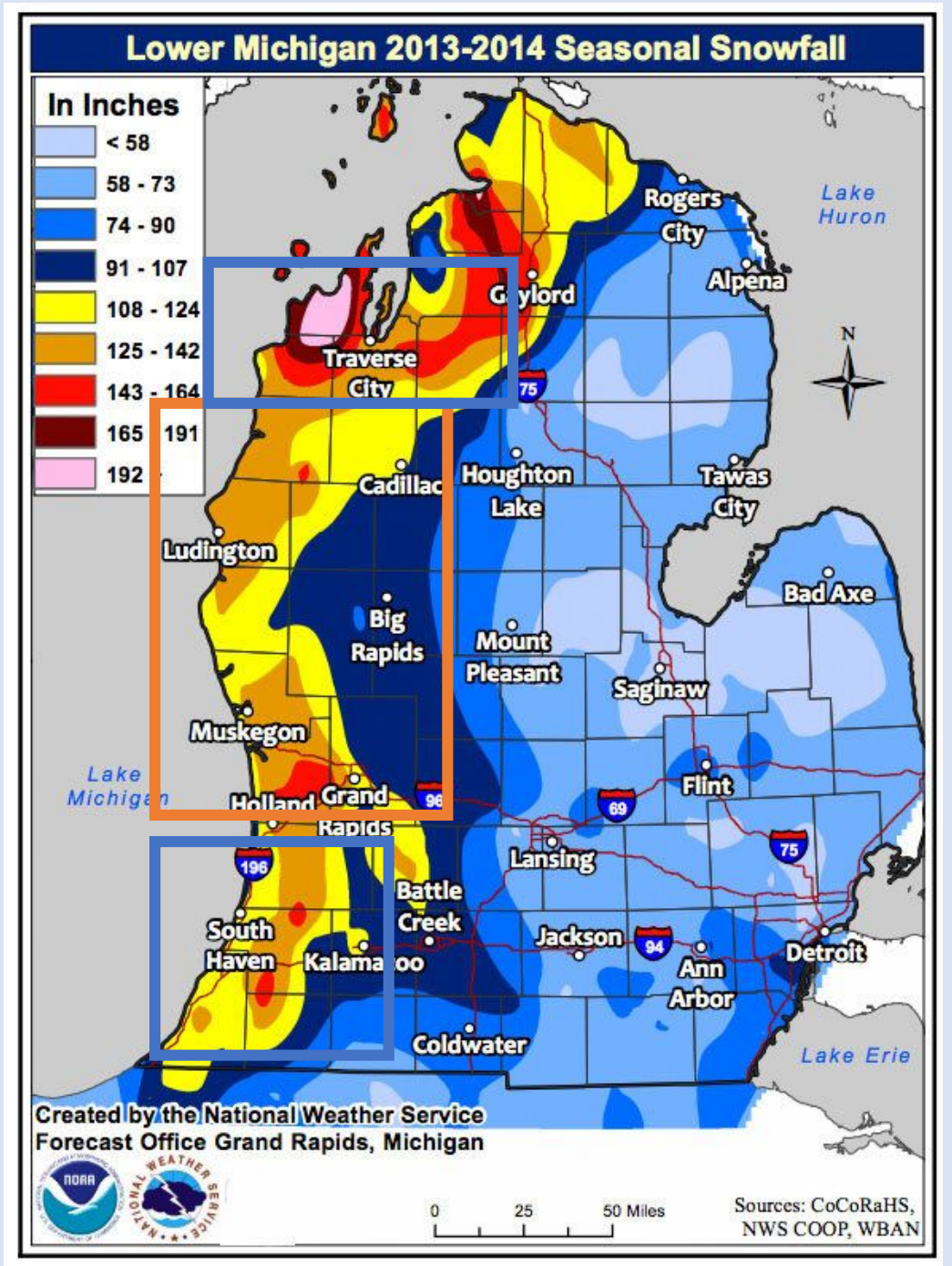
Vitis vinifera

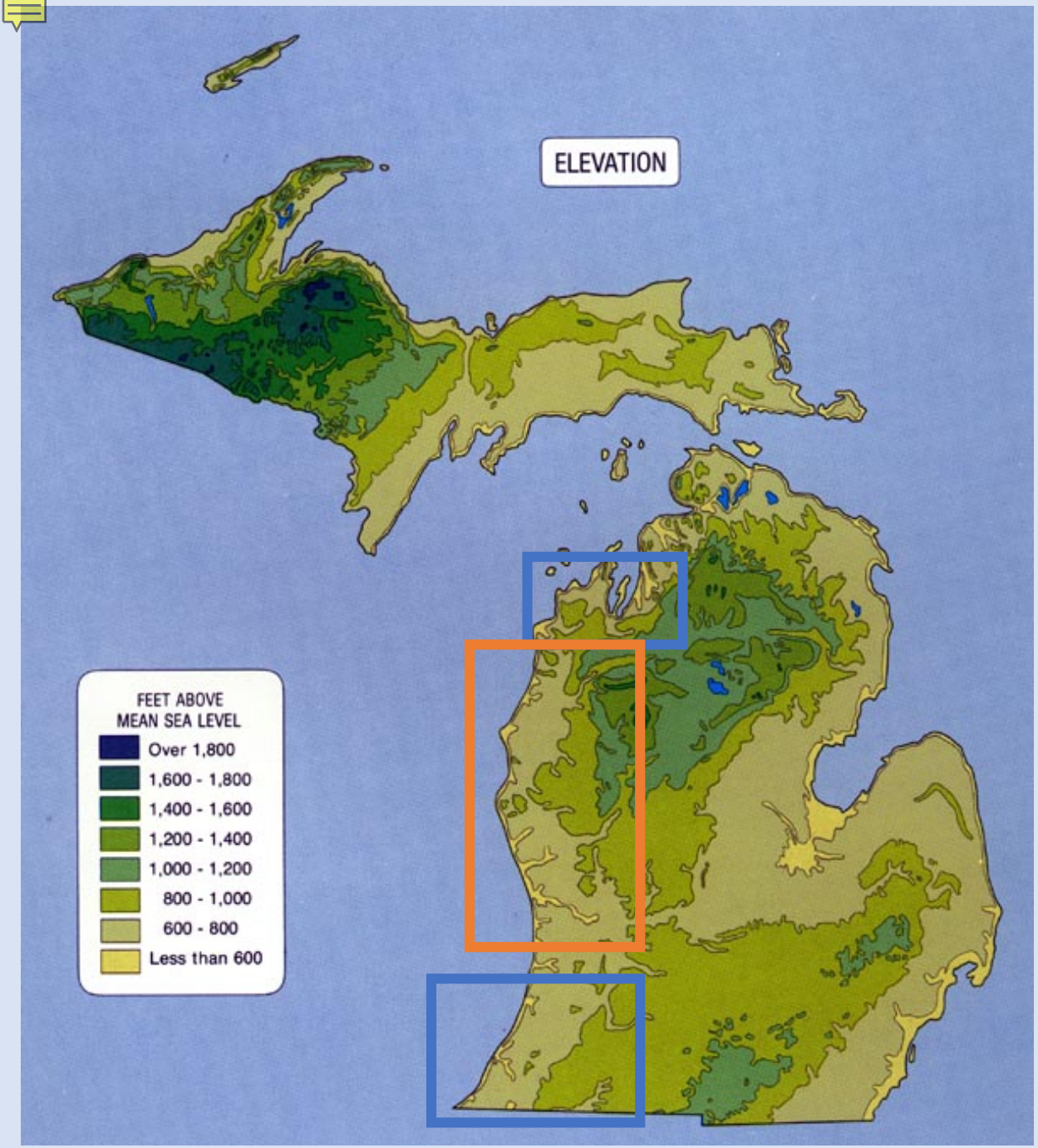
- Zones 6 or 7

Vitis labruscana & hybrid varieties

- Zone 5

Snow: insulator to protect against cold damage to dormant vines over the winter months





Elevation's suitability is balanced with latitude
Determines min & max vineyard temperatures

- Area of Interest ranges from 0 – 1400 feet above sea level
  - *Mason County*: 43.9°N, 86.5°W
    - 0 – 1000 feet above sea level
- Variation of elevation is key

Tip of the Mitt AVA

- *Cheboygan County*: 45.5°N, 84.5°W
  - 0 – 1400 feet above sea level

Leelanau/Old Mission Peninsula

- *Leelanau County*: 45°N, 86°W
  - 0 – 1400 feet above sea level

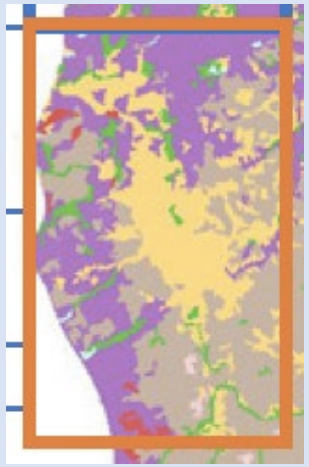
Fennville AVA

- *Fennville Allegen*: 43°N, 86°W
  - 0 – 1400 feet above sea level

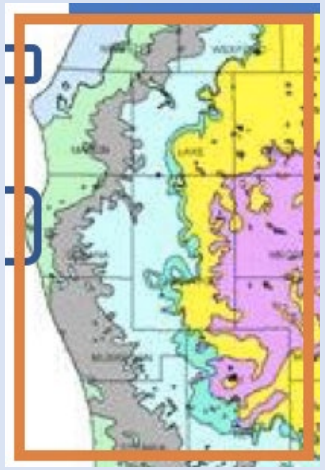
Lake Michigan Shore AVA

- *Berrien County*: 42°N, 86.7°W
  - 0 – 1000 feet above sea level

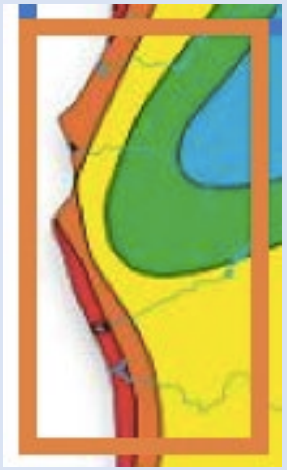
Geography:
West coast Manistee & Mason Counties



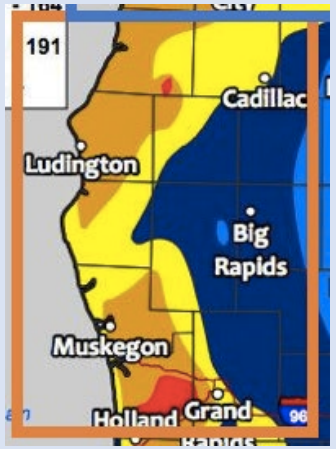
Soil Taxonomy:
Spodosols
Alfisols
Entisols
Histosols



Bedrock Parent Material:
Ellsworth Shale
Coldwater Shale
Antrim Shale



USDA Cold Hardiness Zone:
Zone 5:
-15 - -10°F
Zone 6:
0 - -10 °F



Average Winter Snowfall
125 – 142”

Elevation:
0 – 1400 feet above sea level

Mason County:
43.9°N, 86.5°W

Area of Interest Conclusions

- **Geography:** between 2 existing AVAs in an area of lower direct competition.
- **Soil Taxonomy:** Blend of soils providing nutrients, organic matter, water retention, slope, slightly acidic.
- **Bedrock Parent Material:** Blend contributing organic matter, limestone, fossils, clay and fine grain sandstone.
- **USDA Cold Hardiness Zone:** Appropriate for hybrids and vinifera cultivars. Temps anticipated to increase up to 6.3°F by 2100.
- **Average Winter Snowfall:** Excellent insulation against winter temperatures & weather events during dormancy.
- **Elevation:** Comparable to surrounding AVAs.

References

Cross, R., Plantinga, A. J., & Stavins, R. N. (May 2011). What is the Value of Terroir. *American Economic Review: Papers and Proceedings, 101,* 2, 152-156.

Goldammer, T. (July 2015). Grape Grower's Handbook, A Guide to Viticulture for Wine Production. *Apex Publishers, 2nd edition,* pp. 51.

Schultze, S. R., Sabbatini, P., & Luo, L. (December 01, 2016). Effects of a warming trend on cool climate viticulture in Michigan, USA. *Springerplus, 5,* 1, 1-15.

Map Sources

Bedrock Map: http://www.geo.mtu.edu/MiTEP/EarthCache/BlueRidgeEsker/

Soil taxonomy: http://geo.msu.edu/extra/geogmich/soils.html

Snowfall: http://www.mlive.com/weather/index.ssf/2014/08/season_snow.html

USDA Plant Hardiness zone: http://www.visitludington.com/stories/michigan_plant_hardiness_zones

Elevation: http://geo.msu.edu/extra/geogmich/relief.html

Michigan Counties: http://alabamamaps.ua.edu/contemporarymaps/usa/states/Michigan.html

Michigan wineries: https://www.michiganwines.com/-wine-adventure