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Revised Bedrock Map of Wayne County, Michigan: An Opportunity to reassess the natural resources of Wayne County

Peter Voice

With contributions from William B. Harrison III, Katharine Rose, and Jennifer Trout

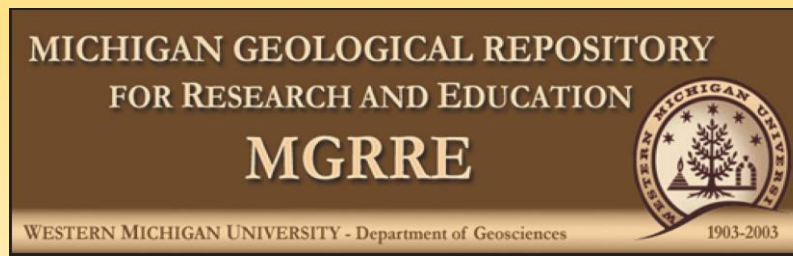
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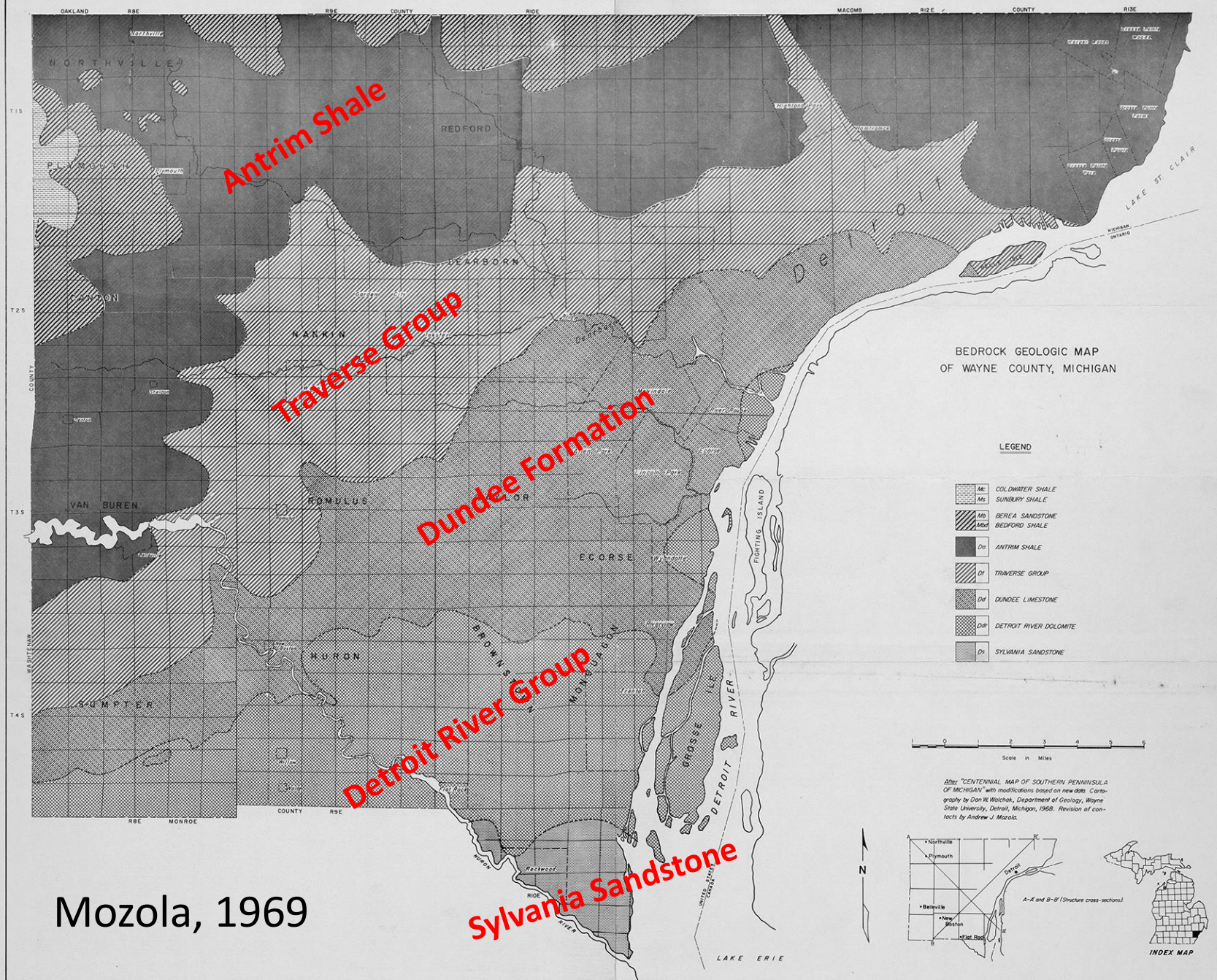
Why Map Bedrock?

- Periodic mapping of bedrock units provides up to date information
 - Refine and revise estimates of resources in place
 - Better maps for construction and geotechnical work
 - Provide more accurate estimates of the types of natural hazards that may impact the area and their potential magnitude and frequency
- Provide more information on the Earth's history at the regional scale

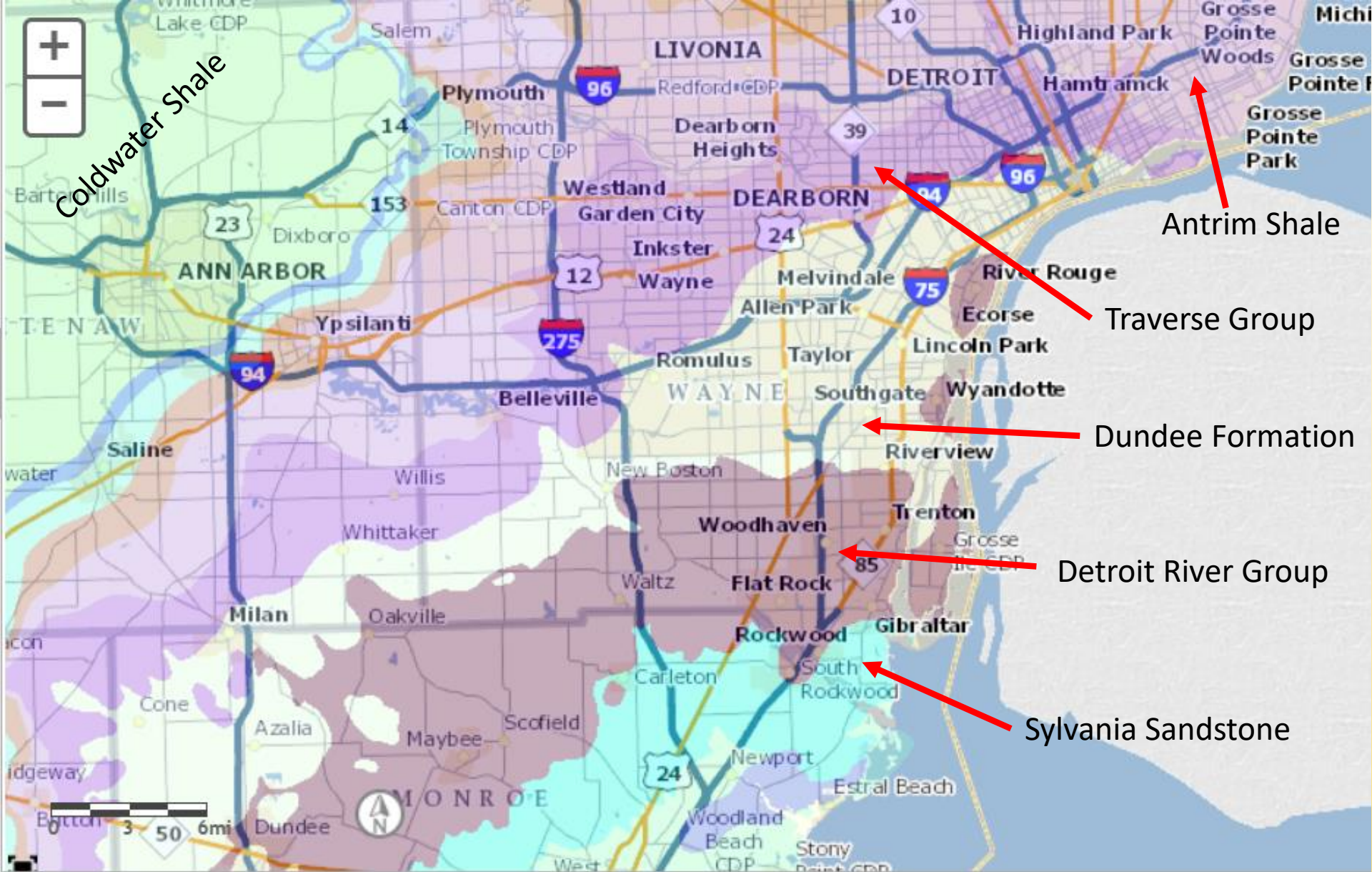
Practical – of use to Urban Planners,
Construction Managers, Civil
Engineers, Geologists, Any Citizen

Fun
science





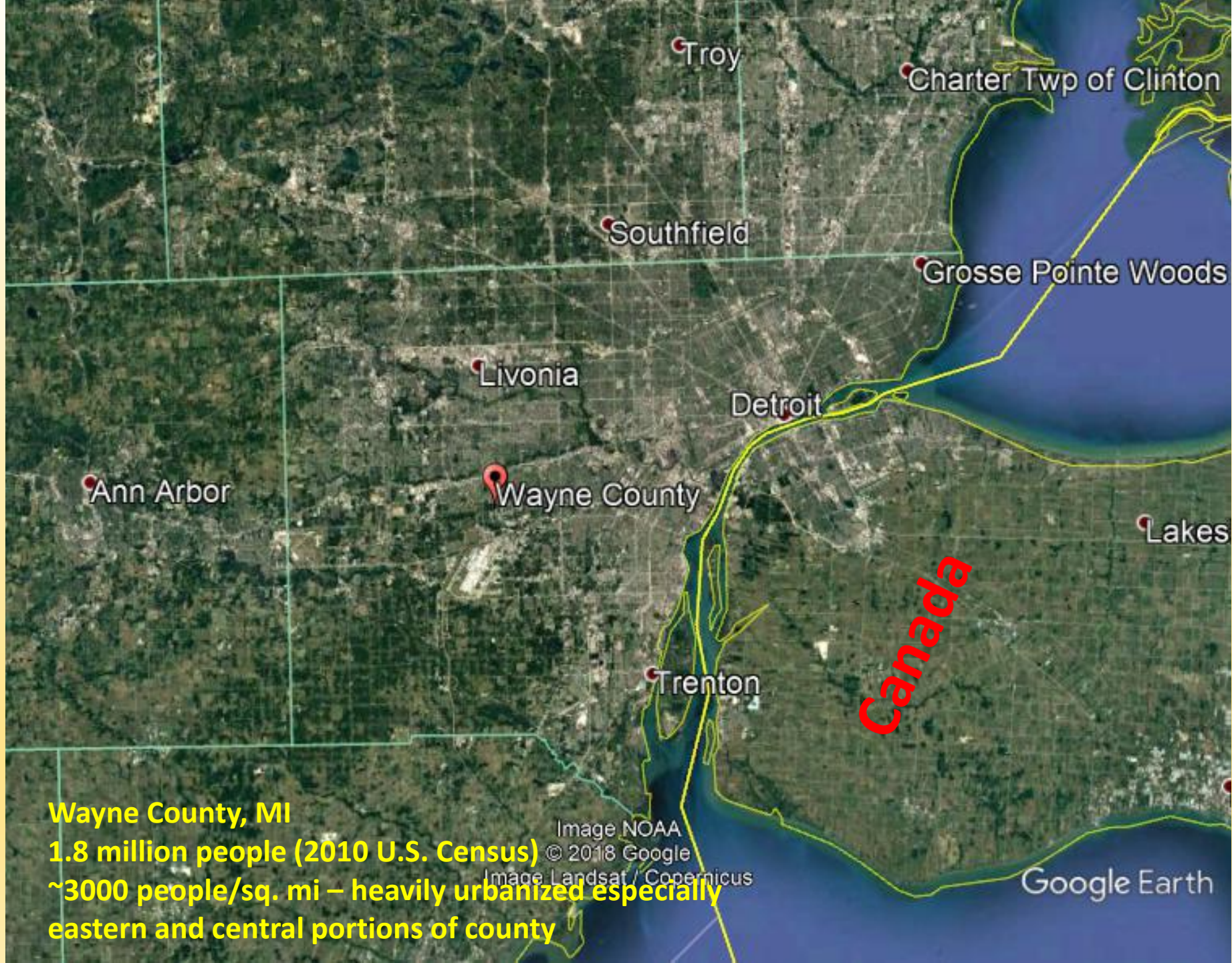
Mozola, 1969



1987 Bedrock Map/Modern Geowebface Bedrock Map Layer

Modified from <http://www.deq.state.mi.us/GeoWebFace/>

Thin brown and blueish units in upper left corner = Bedford, Berea, Sunbury



Wayne County, MI

1.8 million people (2010 U.S. Census)

**~3000 people/sq. mi – heavily urbanized especially
eastern and central portions of county**

Image NOAA

© 2018 Google

Image Landsat / Copernicus

Google Earth

Datasets

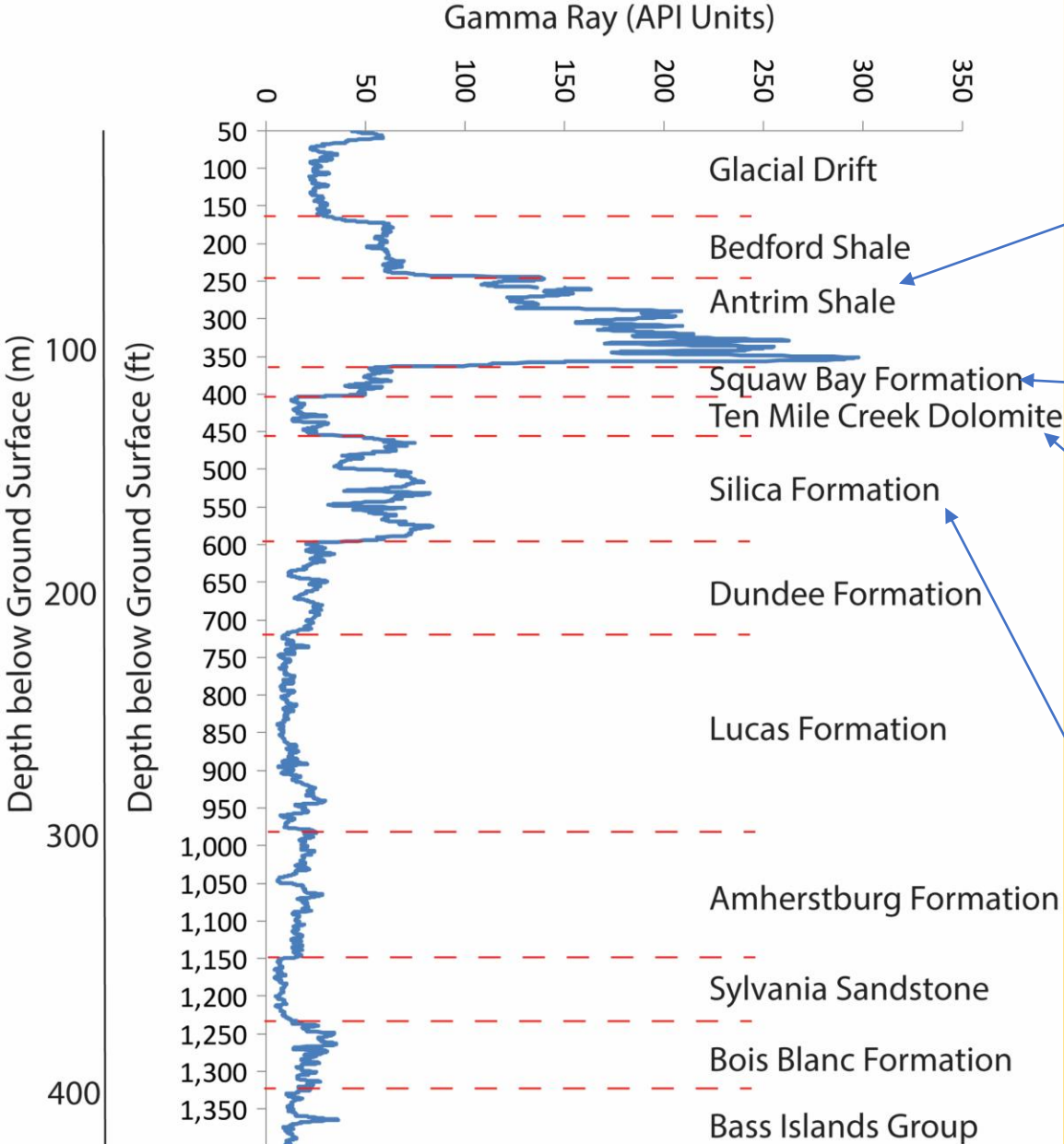
- Drillers reports, core descriptions and measured sections in previous work – Water wells, mineral wells, stratigraphic tests, geotechnical borings, oil and gas wells
- Wireline logs – primarily oil and gas wells
- Cores and Cuttings – oil and gas wells, mineral wells, geotechnical borings
- Student theses – a variety of U of M and WSU student works were quite useful reference materials

Geologic Time				Lithostratigraphic Units	
Period	Epoch	North American Stages	I.C.S. Stages	Group	Formation
Mississippian	No post -Early Mississippian record in Wayne County				
	Early	Kinderhookian	Tournaisian		Coldwater Shale
					Sunbury Sh.
Devonian	Late	Chautauquan	Fammennian		Berea Ss.
					Bedford Sh.
		Senecan	Frasnian		Antrim Sh.
					Squaw Bay Formation
	Middle	Erian	Givetian	Traverse Gp.	Ten Mile Creek Dol.
					Silica Shale
	Early	Ulsterian	Eifelian	Detroit River Gp.	Dundee Fm.
					Lucas Fm.
			Emsian		Amherstburg Ls.
			Praghian		Sylvania Ss.
			Lockhovian		Bois Blanc Fm. Garden Island Fm. ?
Silurian	Late	Cayugan	Pridoli	Bass Islands Gp.	No Record
			Ludfordian		
	Early	Niagaran	Gorstian	Salina Gp.	Undifferentiated
			Homerian		A-G Units
			Sheinwoodian	Niagara Gp.	Guelph Dol.
			Aeronian-Telychian		Lockport Dol.
		Medinan	Rhuddanian	Cataract Gp.	Clinton Fm. ?
					Cabot Head Sh. Manitoulin Dol.
Ordovician	Late	Cincinnatian	Hirnantian		No Record
	Middle	Mohawkian	Katian	Richmond Gp.	Cincinnatian (Undiff.)
			Sandbian		Utica Sh.
			Darriwillian		Trenton Fm. Black River Fm. Glenwood Fm.
		Whiterockian	Dapingian		
			Tremadocian-Floian		No Record
	Early	Ibexian			
Cambrian	Late	Croixian	Paibian	Munising Gp.	Trempealeau Fm. Franconia Fm. Galesville Ss. Eau Claire Fm. Mt. Simon Ss.
Undifferentiated Precambrian Basement Rocks					

Bedrock Units

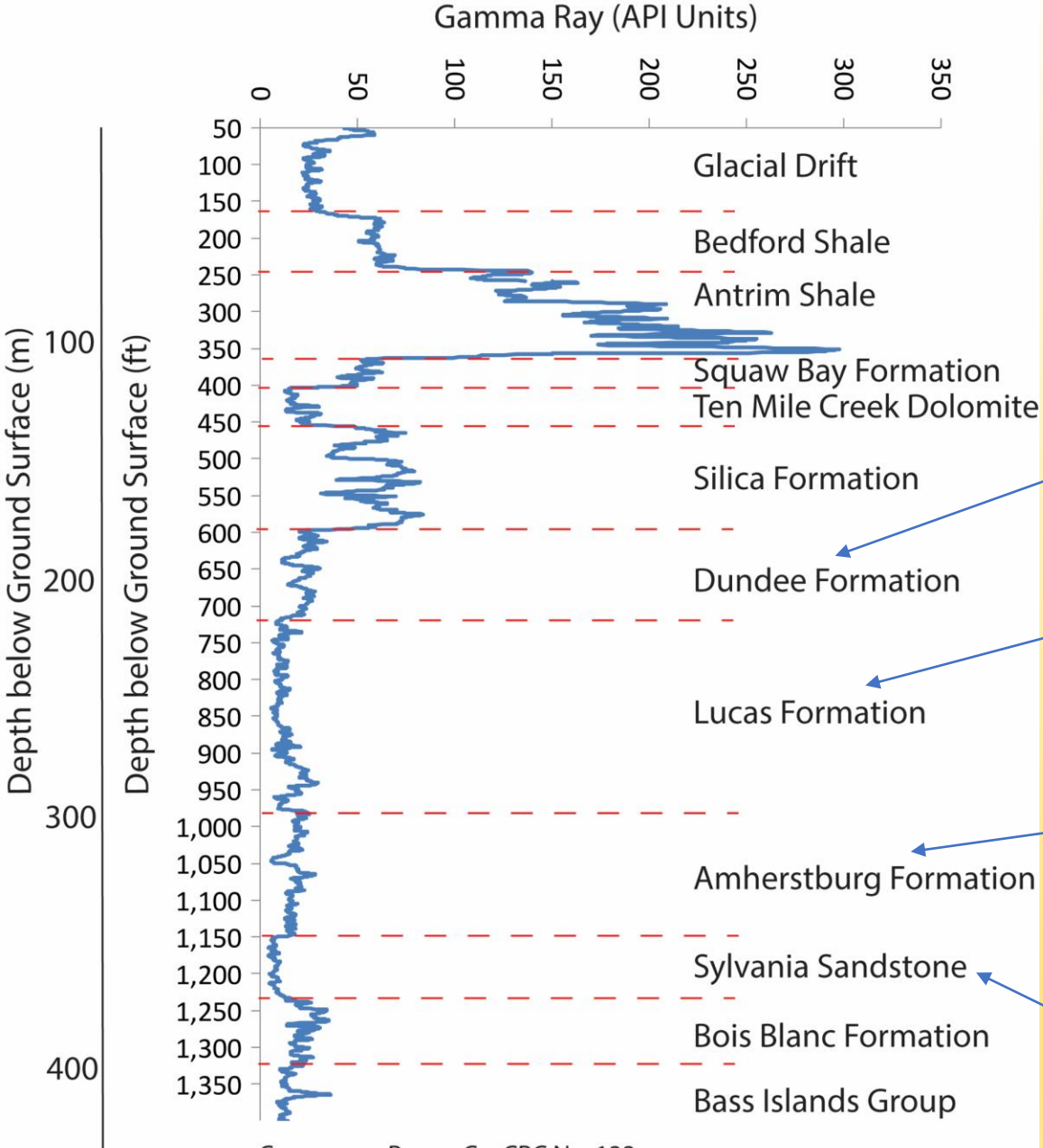
Proposed Stratigraphic Column for Wayne County

Deeper drilling provides access to pre-Sylvania units (with even a couple injection wells providing access to Precambrian basement rocks!)



Consumers Power Co. CPC No. 133
PN: 18946
22-15-8E, Wayne Co.
drill floor elevation - 809 ft (246 m) above sea level
Drilled June 1965





Consumers Power Co. CPC No. 133

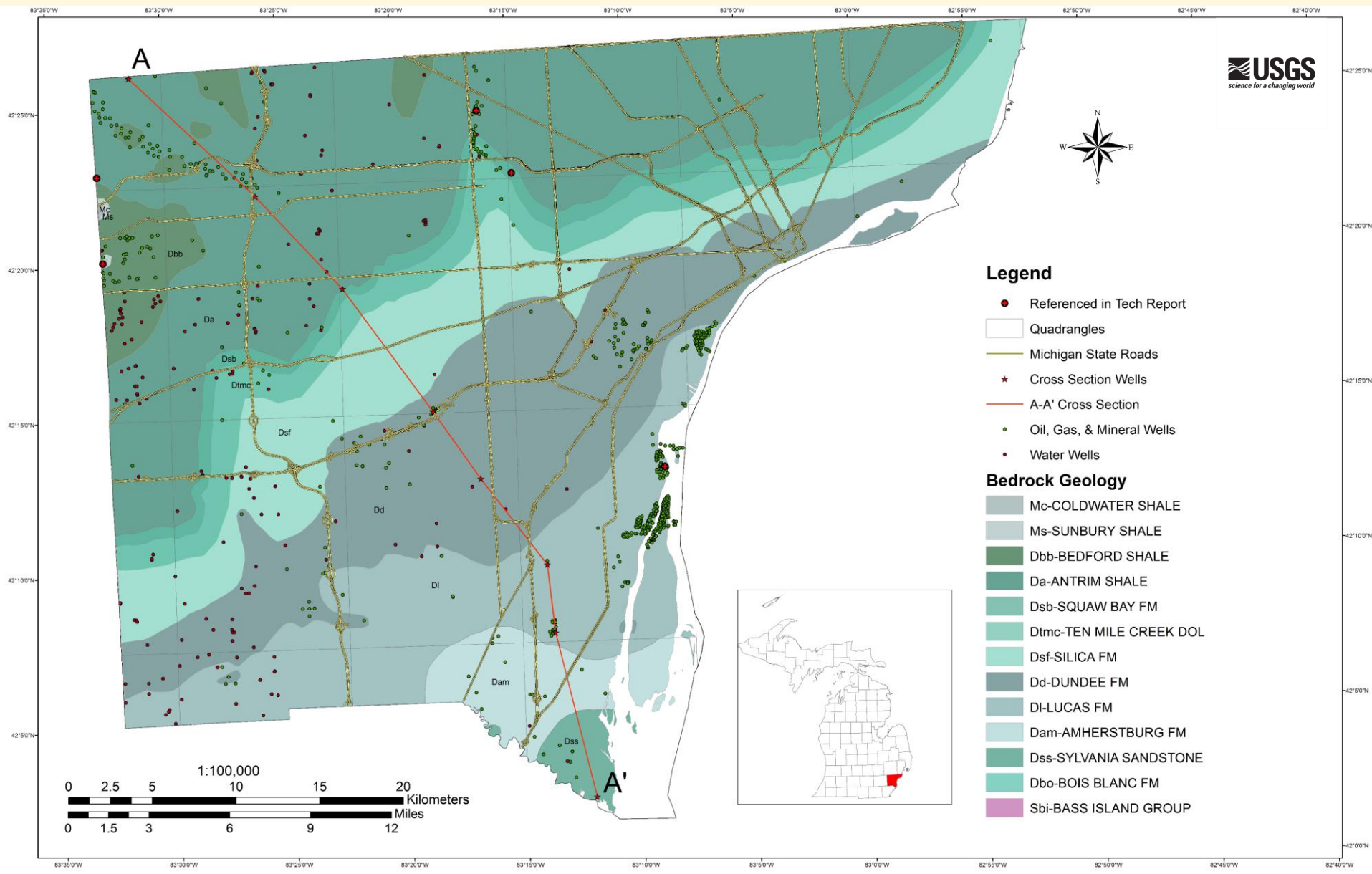
PN: 18946

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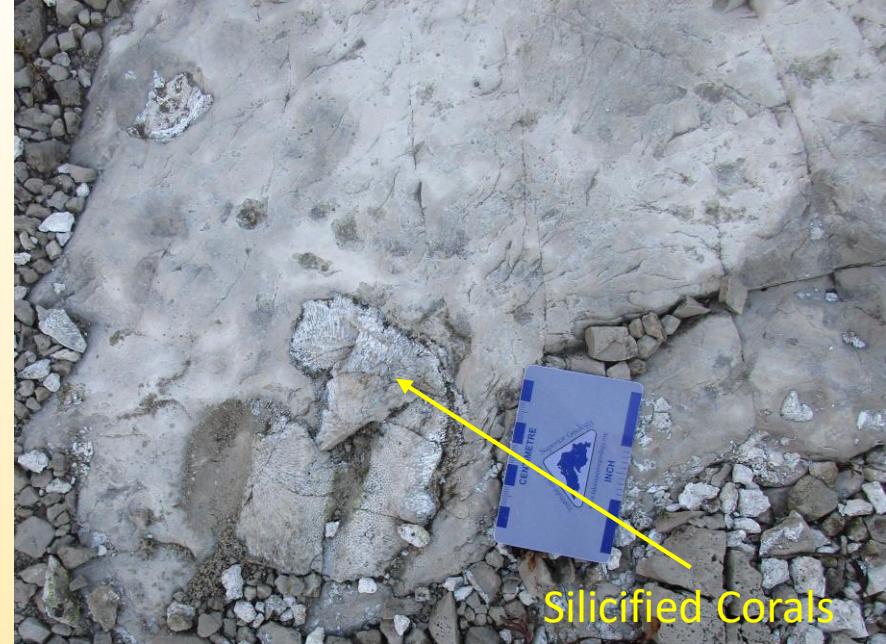
Our Interpretation of the Bedrock Geology of Wayne County



Natural Resources of Wayne County

- Historic crushed rock and clay production
- High quality sands – glass sands
- Rock salt
- Oil and Natural Gas Production
- Current and historic LPG and Natural Gas Storage (Northville Field)

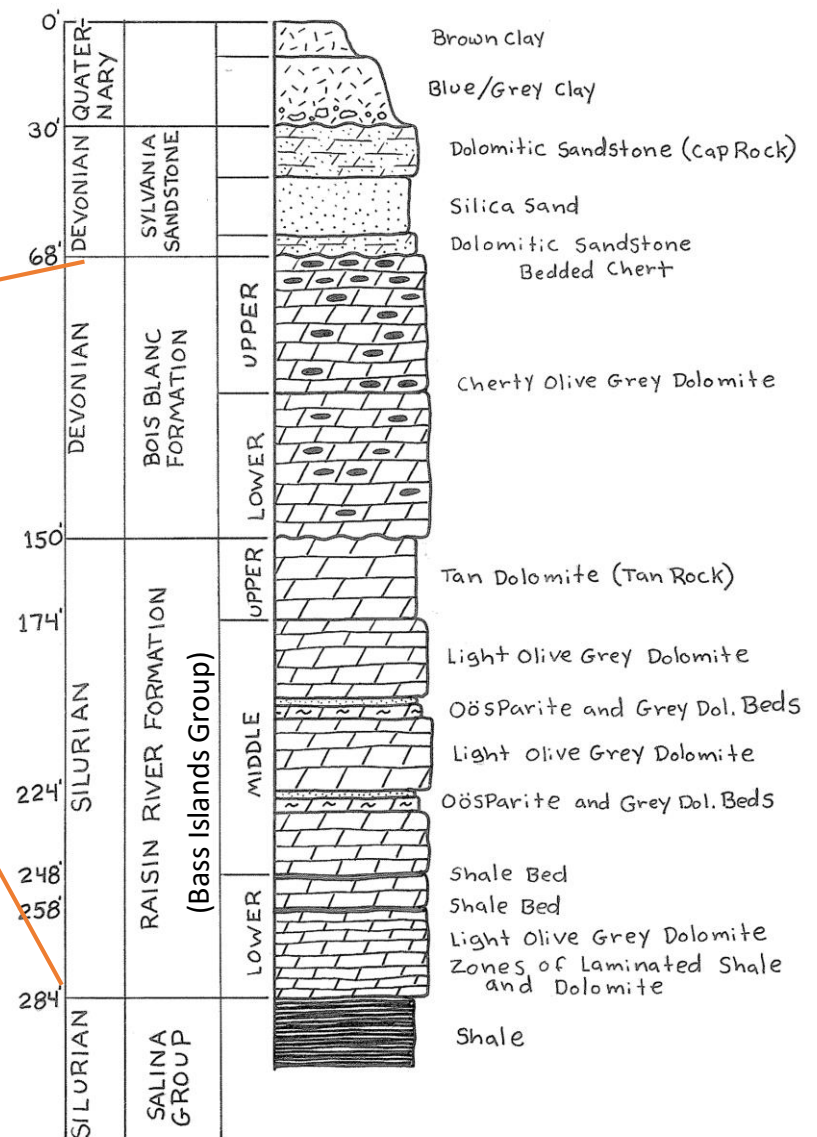
Sibley Quarry, Trenton, MI
Walls = Lucas Fm. (primarily) and Dundee
Fm. (upper bench near structure)



Quarry floor – Amherstburg Fm.

Microbial carbonates in the Lucas Formation





<https://www.greatlakesagg.com/sylvania-minerals-quarry/#geology>

Great Lakes Aggregates' Sylvania Minerals Quarry



Glacial Drift

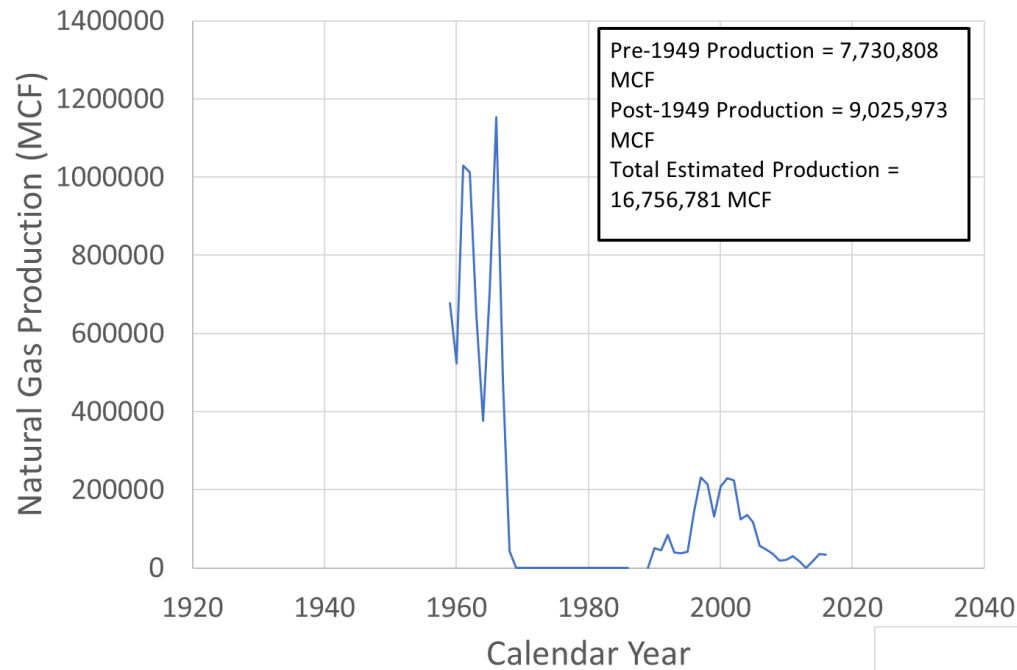
Sylvania Sandstone



Bored hardground

Great Lakes Aggregates'
Sylvania Minerals Quarry

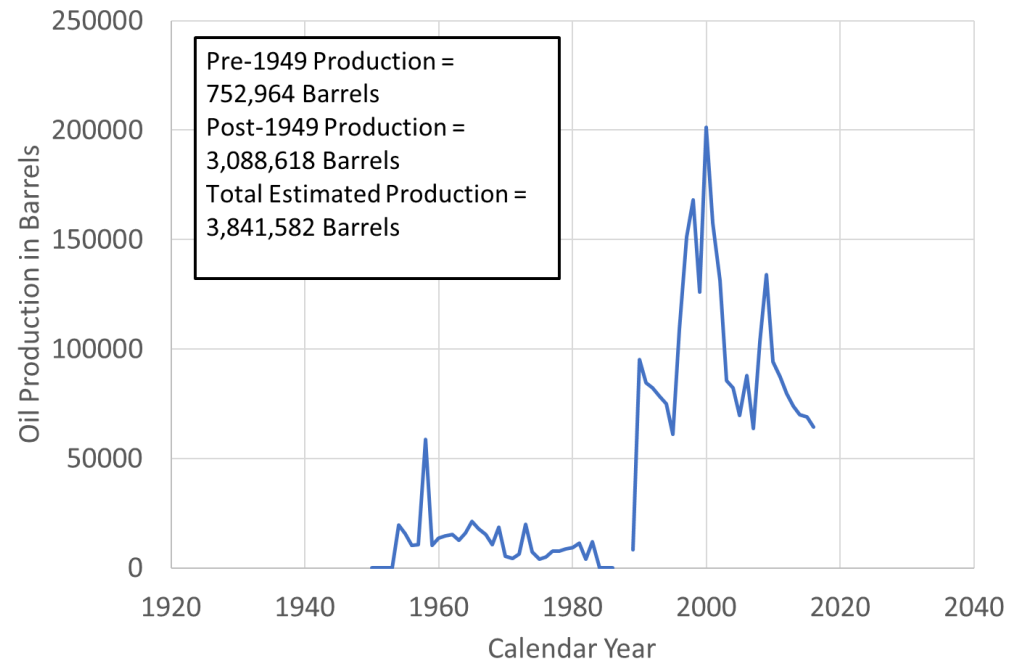
Historic Natural Gas Production in Wayne County



Subsurface Resources



Historic Oil Production in Wayne County



Conclusions

- Our Map is significantly different from our predecessors – as new drilling provided more samples in areas where they had little or no data
 - Much less Upper Devonian or Lower Mississippian bedrock (Bedford-Coldwater) in Wayne County than previously interpreted
 - Enough well control to map formations of the Traverse Group and Detroit River Group
 - Identified the Squaw Bay Formation in Wayne County (older drillers identified it, but not on Mozola's map)