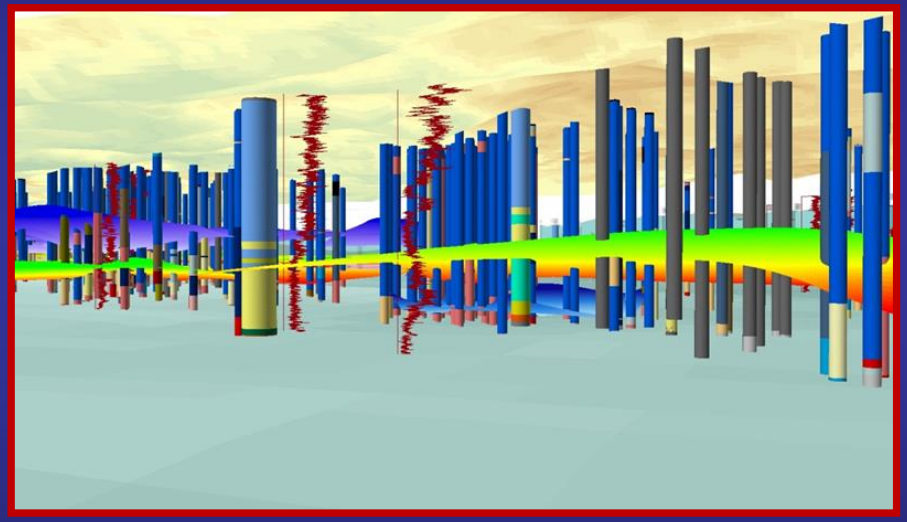
State Museum Geological Mapping Program

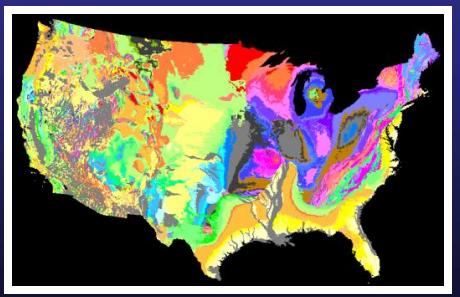


Andrew Kozlowski

Museum Scientist III

Licensed Professional Geologist # 920

May, 2018

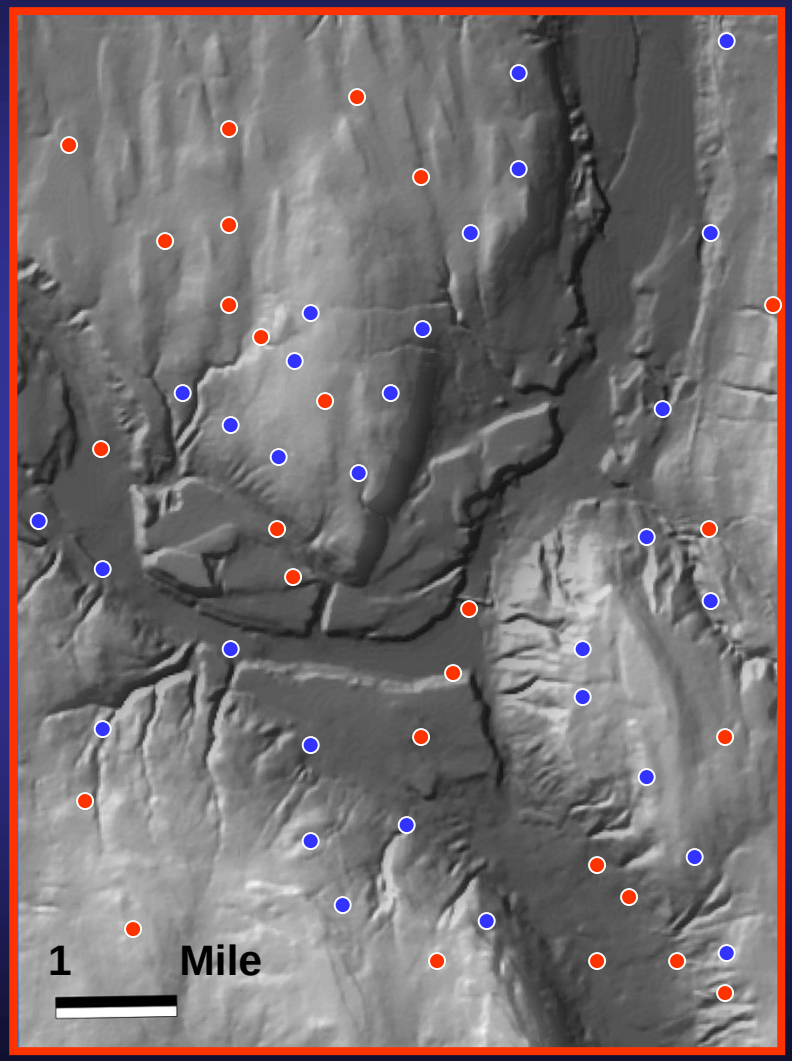


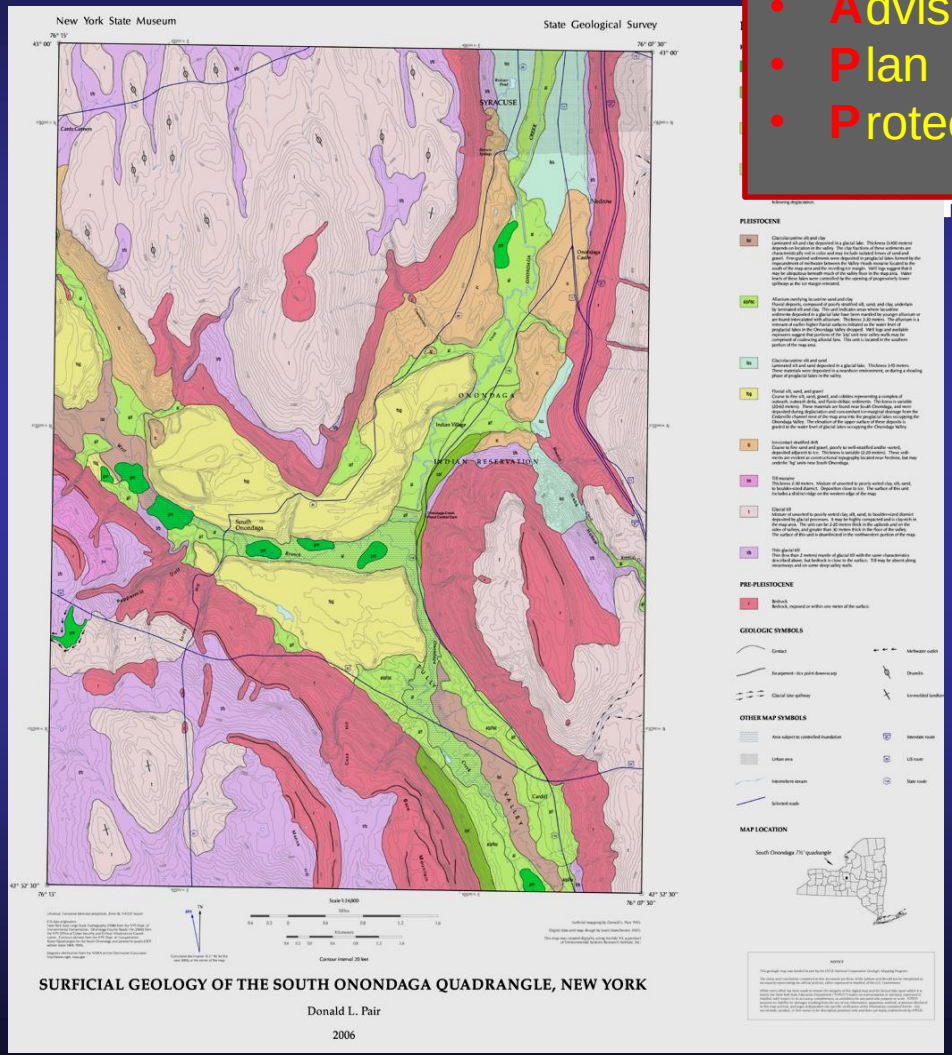
What is a Geologic Map ?

A Tool to Educate

- Teach
- Advise
- Plan
- Protect

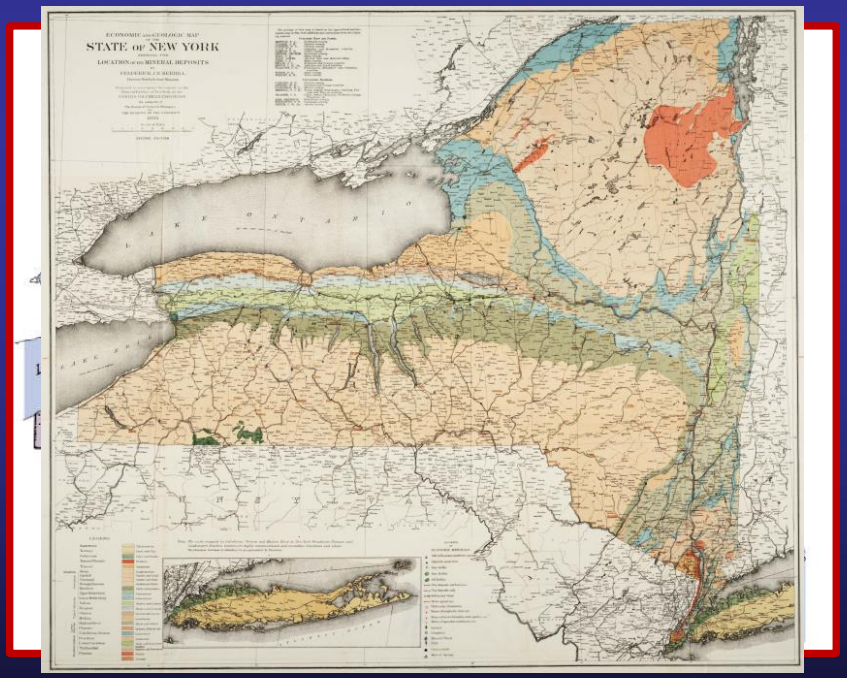
Shaded Relief elevation





Background – Geologic Roots

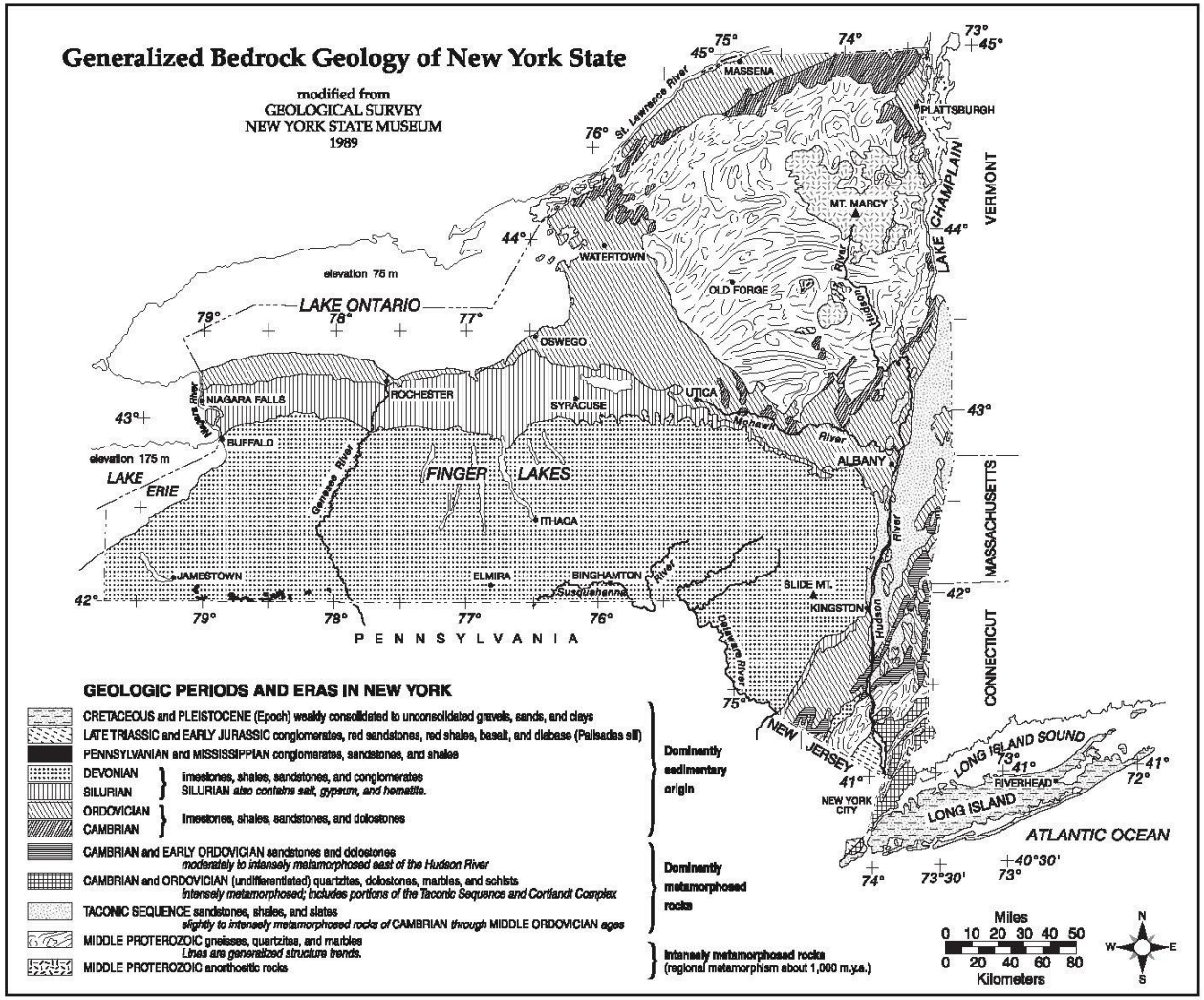
Geology - the science that deals with the earth's physical structure and substance, its history, and the processes that act on it.



- In 1836 appointment of the Geological and Natural History Survey
- In 1843 Legislature creates State Cabinet of Natural History (CNH)
- In 1845, the Legislature placed the Cabinet under the guidance of the Board of Regents.
- 1870 legislature declares CNH to be a Museum of scientific and practical geology and general natural history
  – James Hall First Director
- 1912 Museum moves to State Education Building
- 1916 former President Theodore Roosevelt states. "More than a mere zoologic or scientific museum. It should be a museum of arts and letters as well as a museum of natural history."

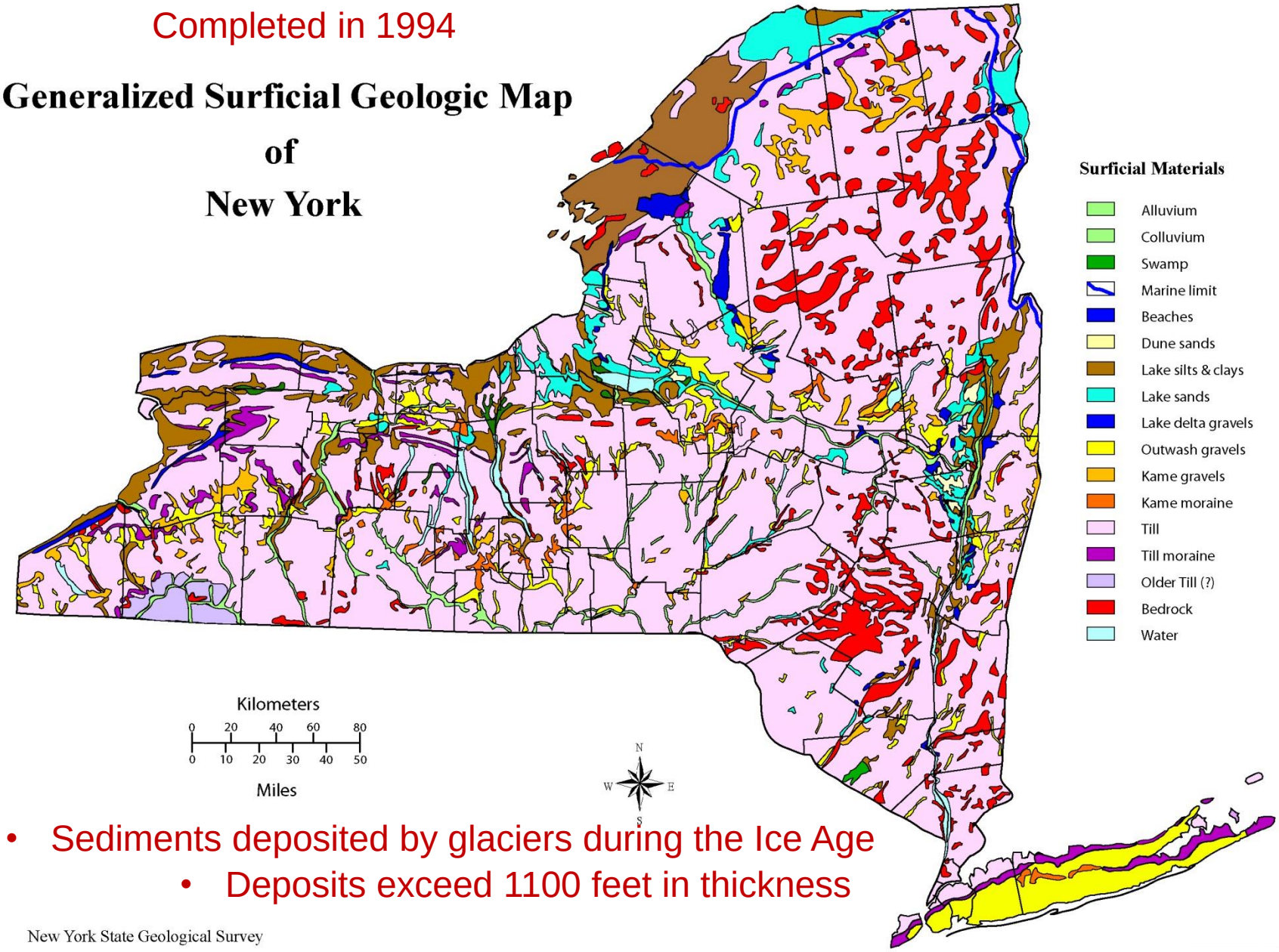
Earliest Statewide Bedrock Geologic Map published 1844, revised 1895, 1901, 1961, 1972

Direct Application to NYSED Curriculum from page 3 of Earth Science Reference tables



Completed in 1994

Generalized Surficial Geologic Map of New York



- Sediments deposited by glaciers during the Ice Age
  - Deposits exceed 1100 feet in thickness

New York State Geological Survey

National Geologic Mapping Act

- **1990 Congressional Recognition**
- **Original authorization 1992**
- **Reauthorized 1997, 1999 and 2008**
- **Set to reauthorize in FY2019**
- **USGS/AASG partnership**

NYSGS
NEW YORK State Museum

NYS M

National Cooperative Geologic Mapping Program Components

FEDMAP - Federal Geological Survey
STATEMAP – State Geological Surveys
EDMAP – University training for students

- **USGS -- Recognizes the NYSM/NYSGS as the authoritative entity that produces geologic maps**
- **STATEMAP—State geological survey projects (each federal dollar matched by state dollar)**
- **National Geologic Map Database—improves access to geologic maps on the Internet**

This is who funds our current work

Great Lakes Geologic Mapping Coalition

Provides funding expressly for 3D-Geological Mapping

- Drilling
- Lidar data
- Geophysics

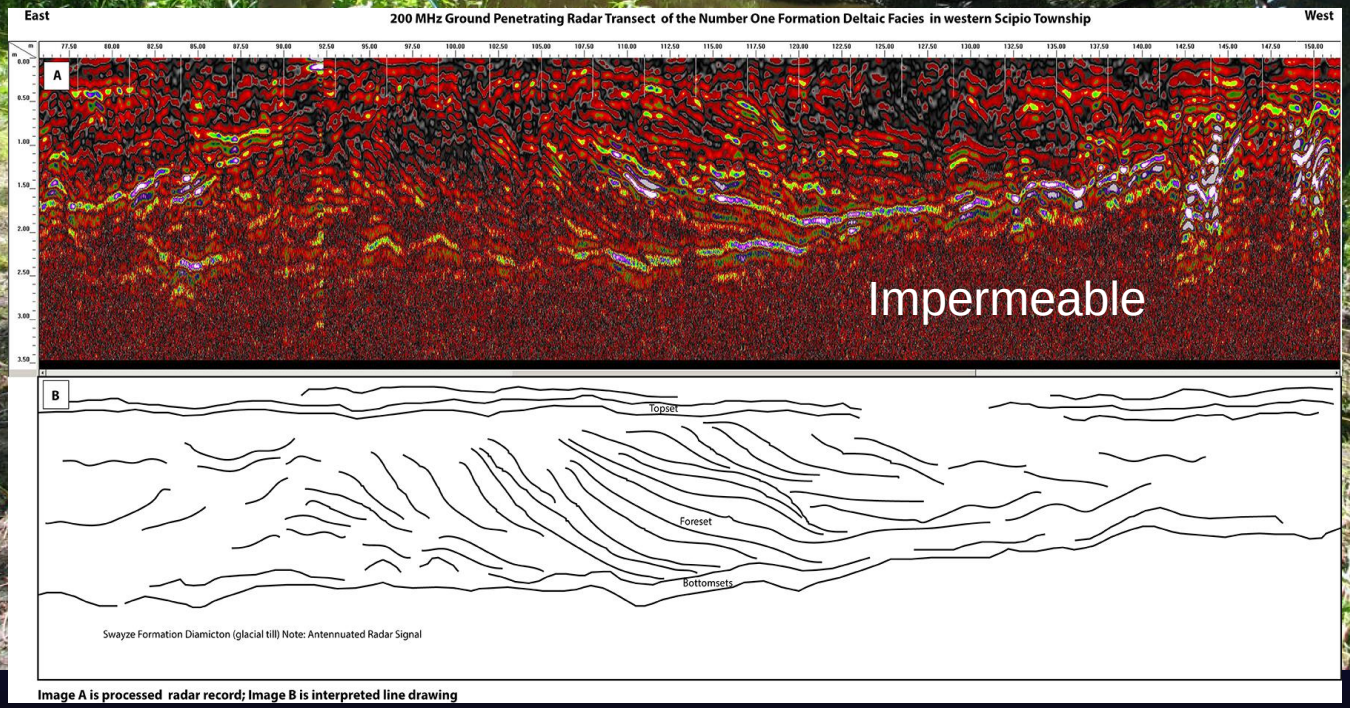
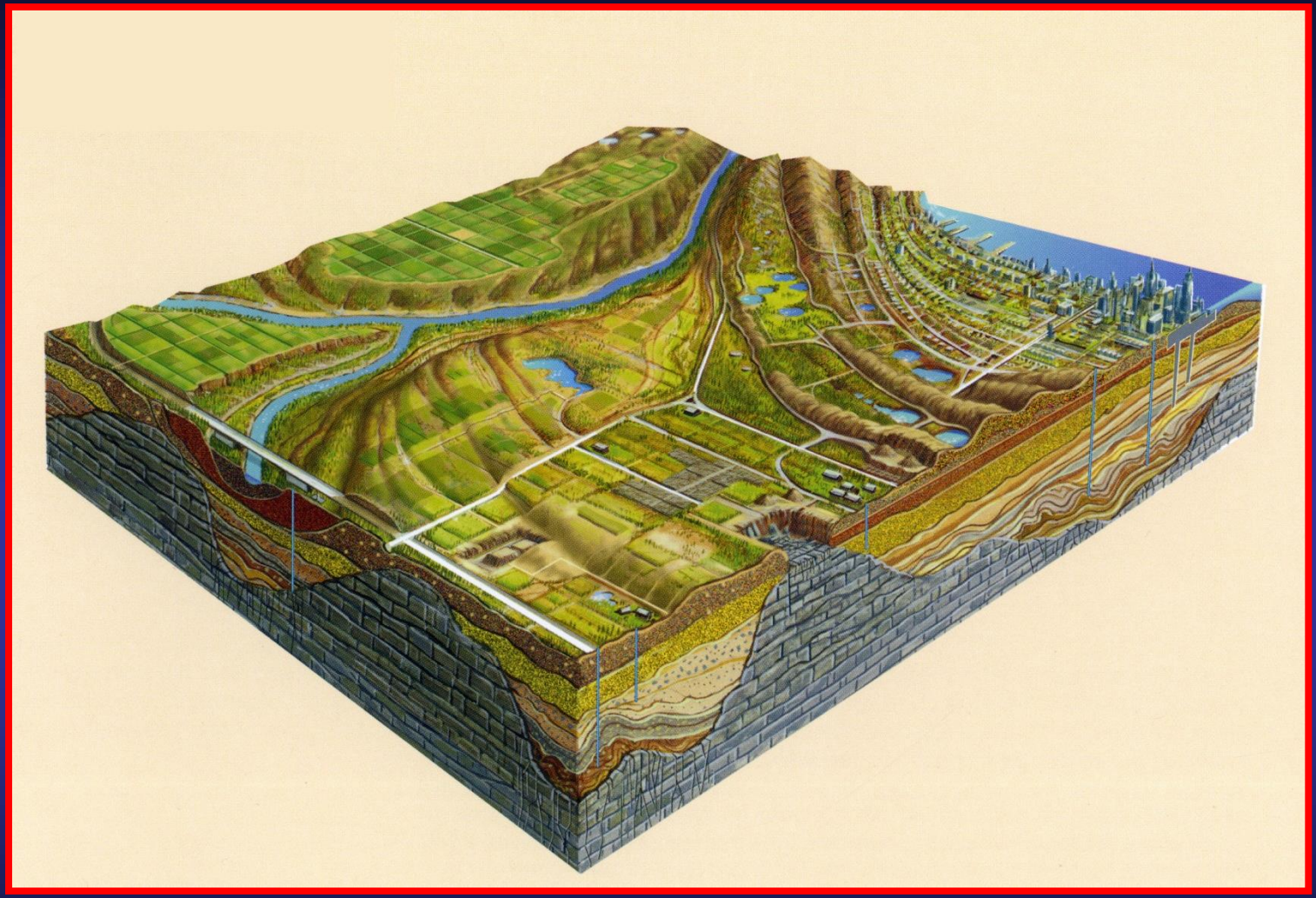


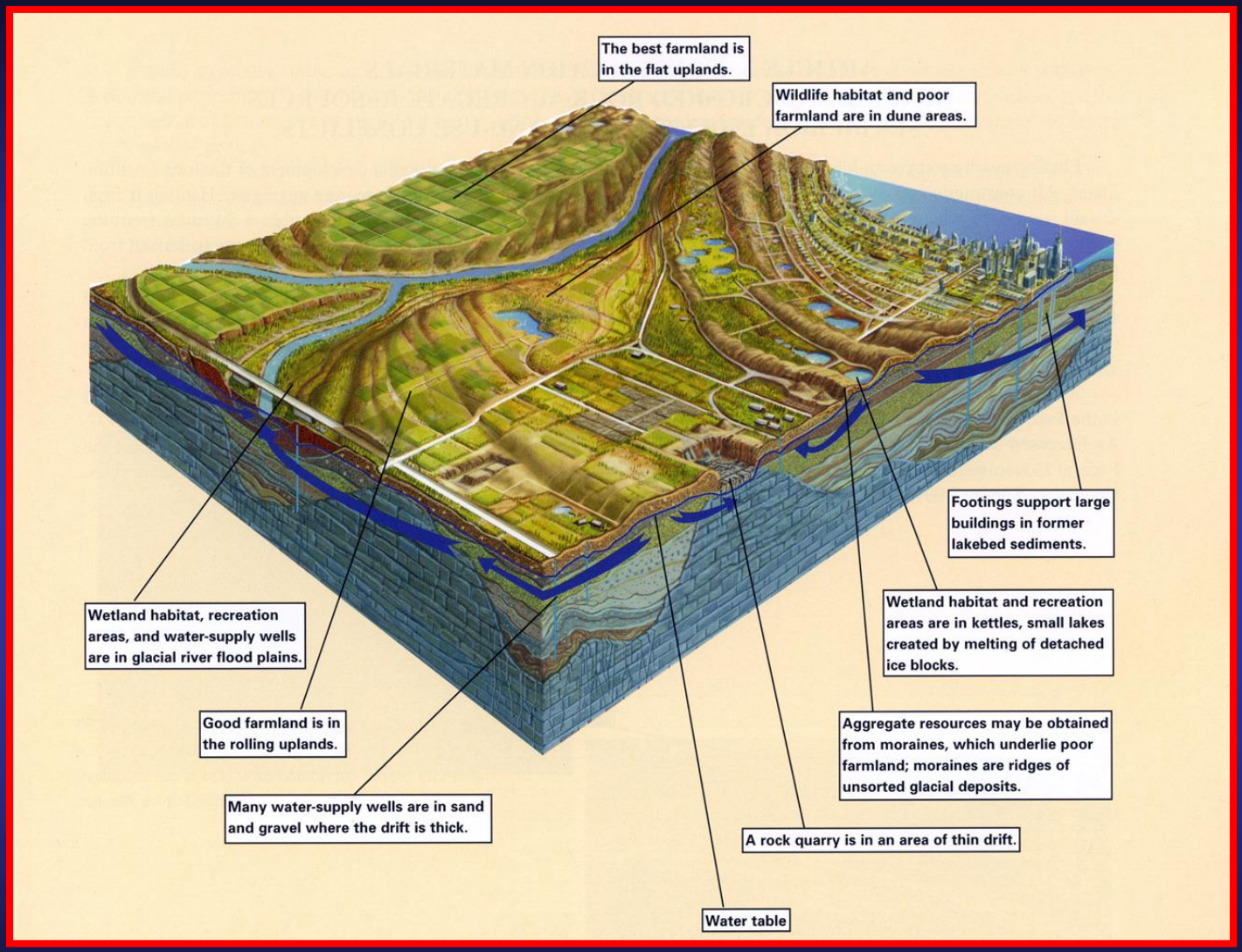
Image A is processed radar record; Image B is interpreted line drawing

NYSGSX
NEW YORK State Museum

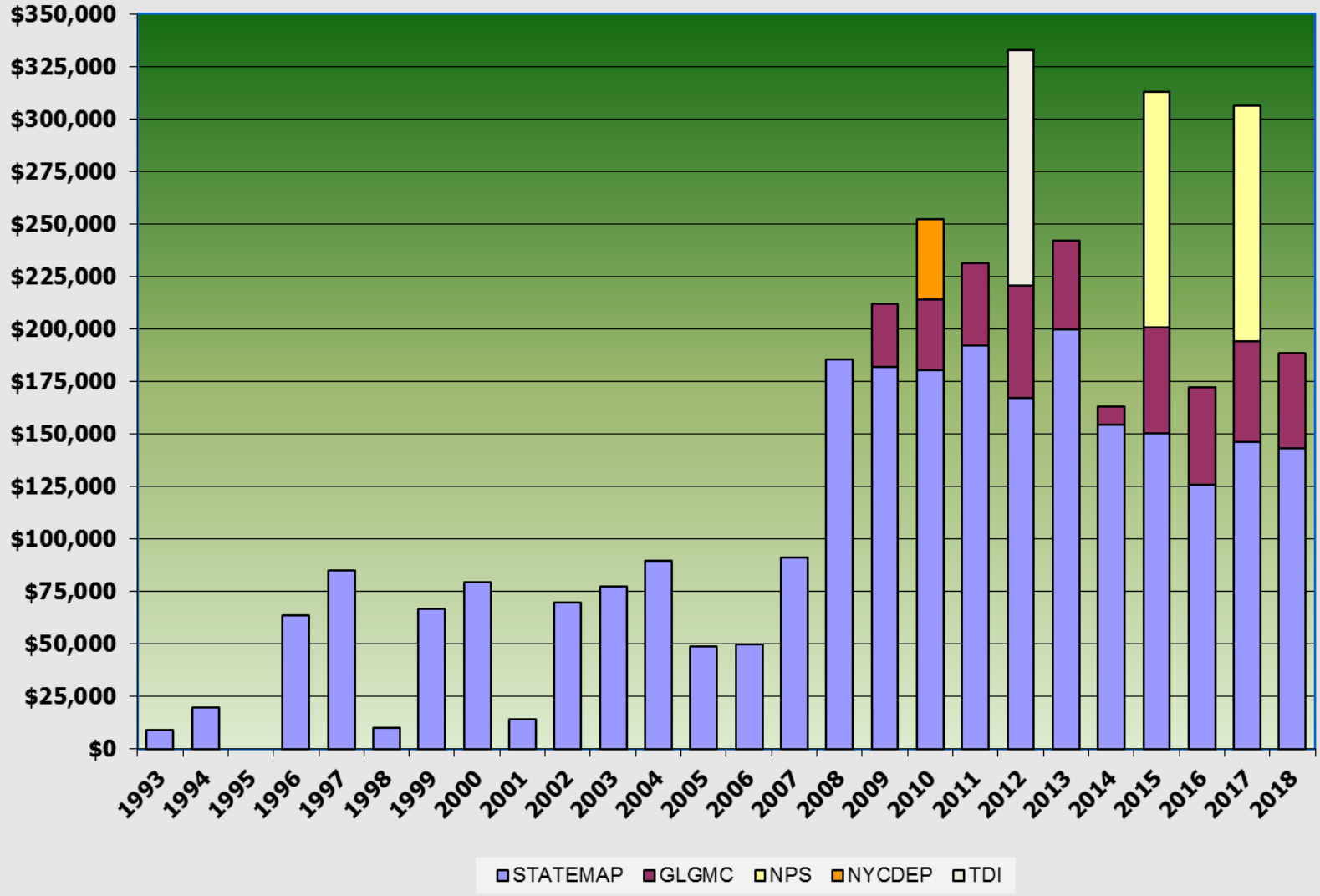
Geology & our Society



Geologic Mapping



NYSM Geological Mapping Program Award History from various Federal, State and Municiple sources



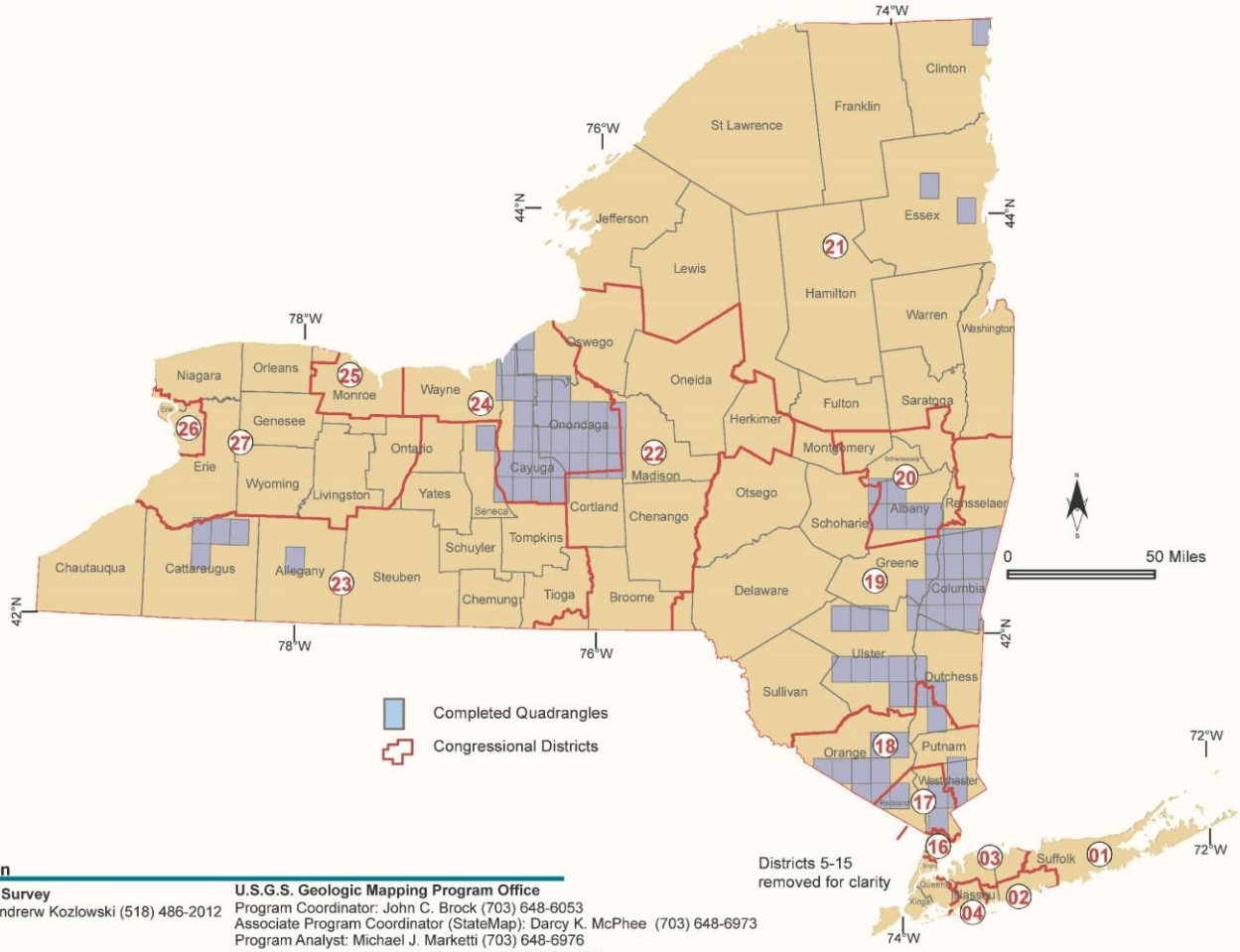
National Cooperative Geologic Mapping Program

STATEMAP Component

AASG Association of American State Geologists

NYS M NYSGS NEW YORK STATE GEOLOGICAL SURVEY

USGS science for a changing world
Unitied States Geological Survey



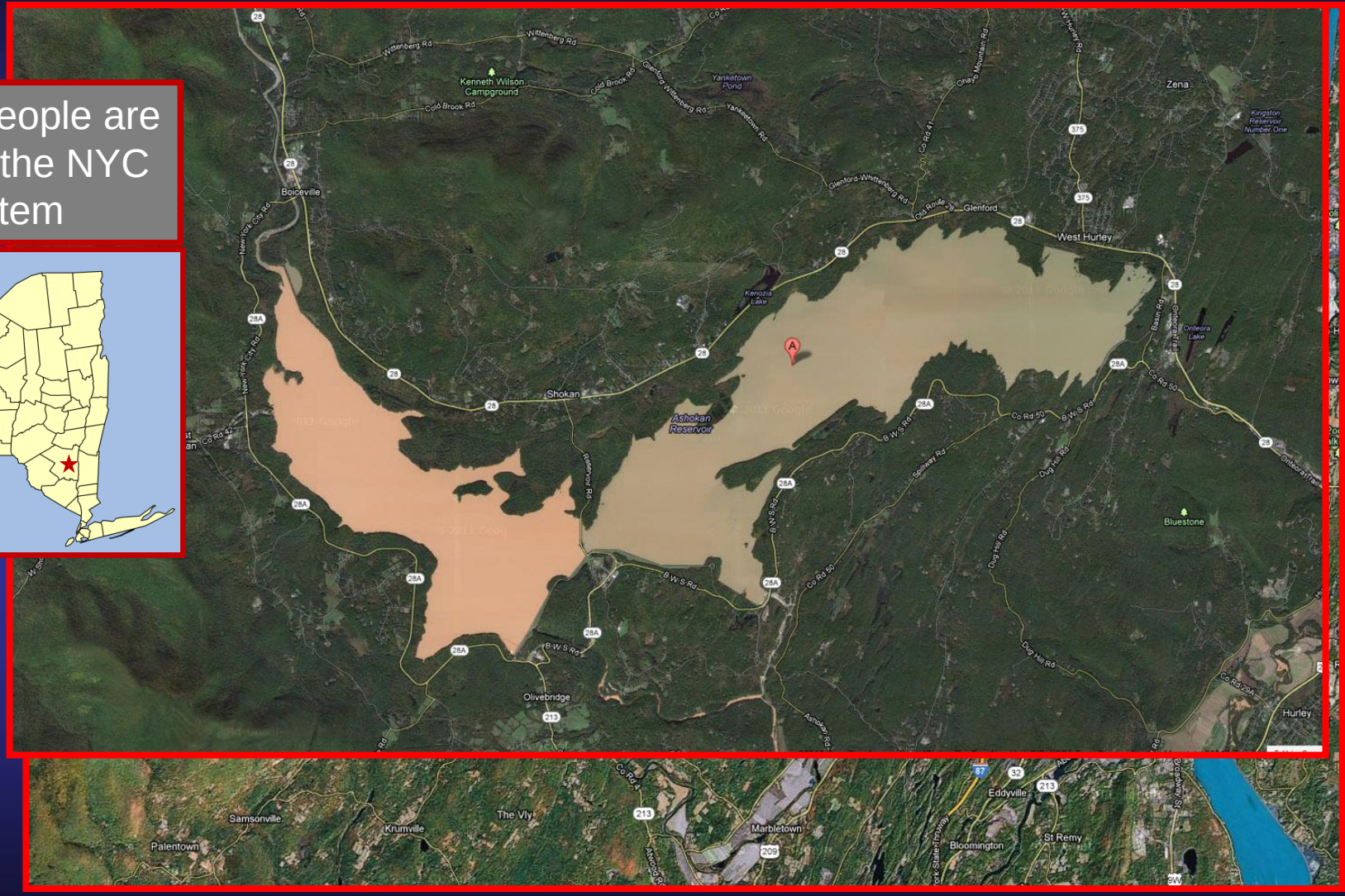
Contact Information

New York Geological Survey
STATEMAP Contact: Andrerw Kozlowski (518) 486-2012

U.S.G.S. Geologic Mapping Program Office
Program Coordinator: John C. Brock (703) 648-6053
Associate Program Coordinator (StateMap): Darcy K. McPhee (703) 648-6973
Program Analyst: Michael J. Marketti (703) 648-6976
Program Assistant: Leshemia J. Morrow (703) 648-6942
http://ncgmp.usgs.gov/

Why We Map - *Geologic Mapping & Water Quality*

9 Million people are served by the NYC Water System

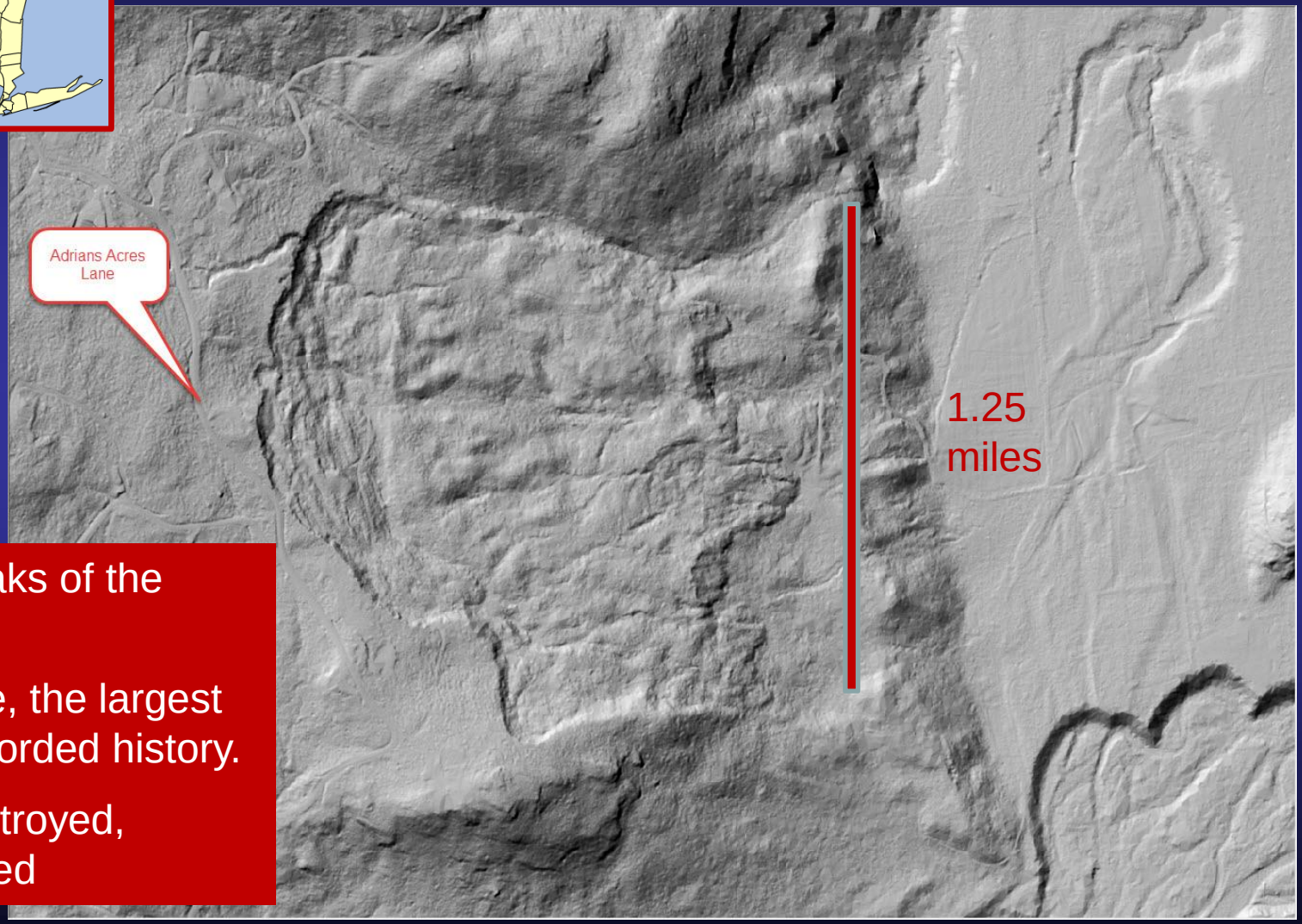


Asked BY NYCDEP to help map surficial geology to understand source of turbidity


During the last Ice Age a glacier filled the Hudson Valley and dammed a large deep lake in the Esopus Creek Valley. Thus depositing a thick blanket of clay and silt onto mountain sides. Floods erode this material causing turbidity

Why We Map – Geologic Hazards

2011 Keene Valley Landslide



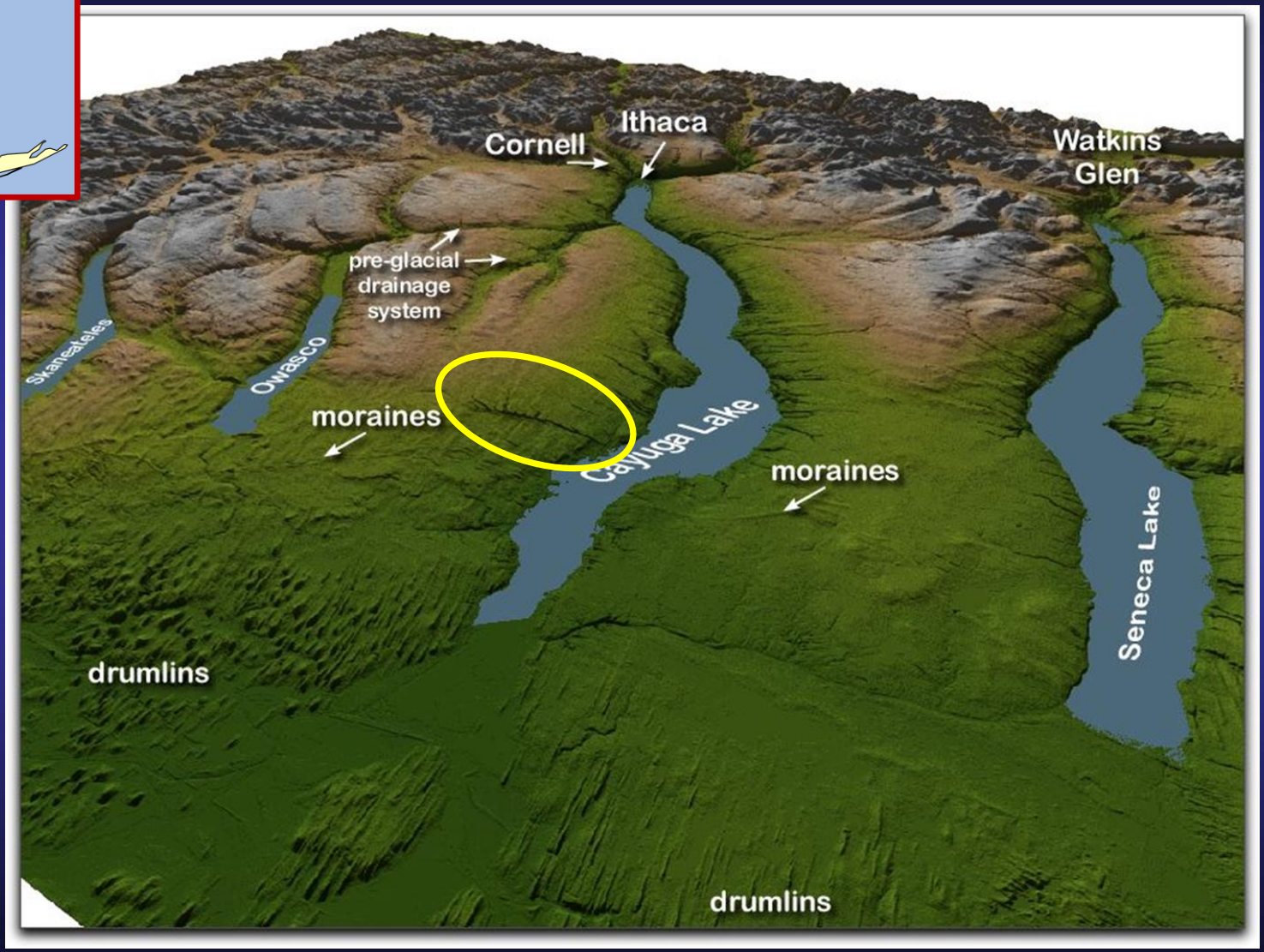
In the High-Peaks of the Adirondacks

82 acres in size, the largest landslide in recorded history.

One house destroyed, several damaged

Keene Valley Slide Progression

Why We Map - Discovery



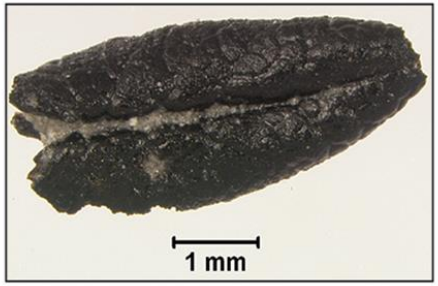
Core T2 100-105 cm needle

Core T2 143-150 Salix Twig

Core F2 85-95 cm Dryas

Core F2 85-95 cm Dryas

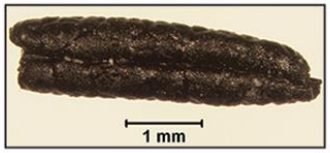
Core T2 115-125 cm bud



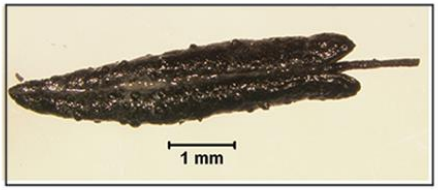
Core T2 150-160 cm B Dryas

Core T2 125-131 cm Needles

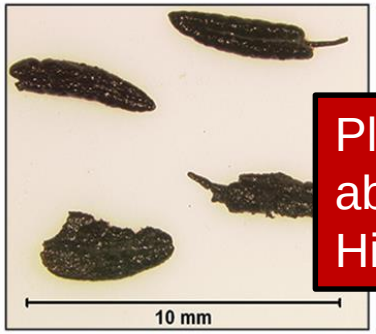
Core T2 170-180 cm A_B_C Dryas



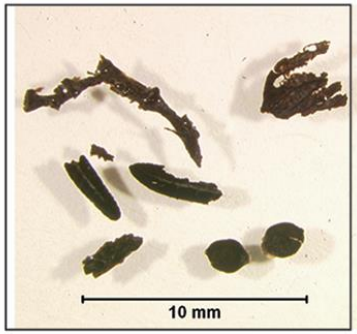
Core T2 143-150 Dryas



Core T2 180-190 cm Dryas



Core W3 210-220 cm Dryas



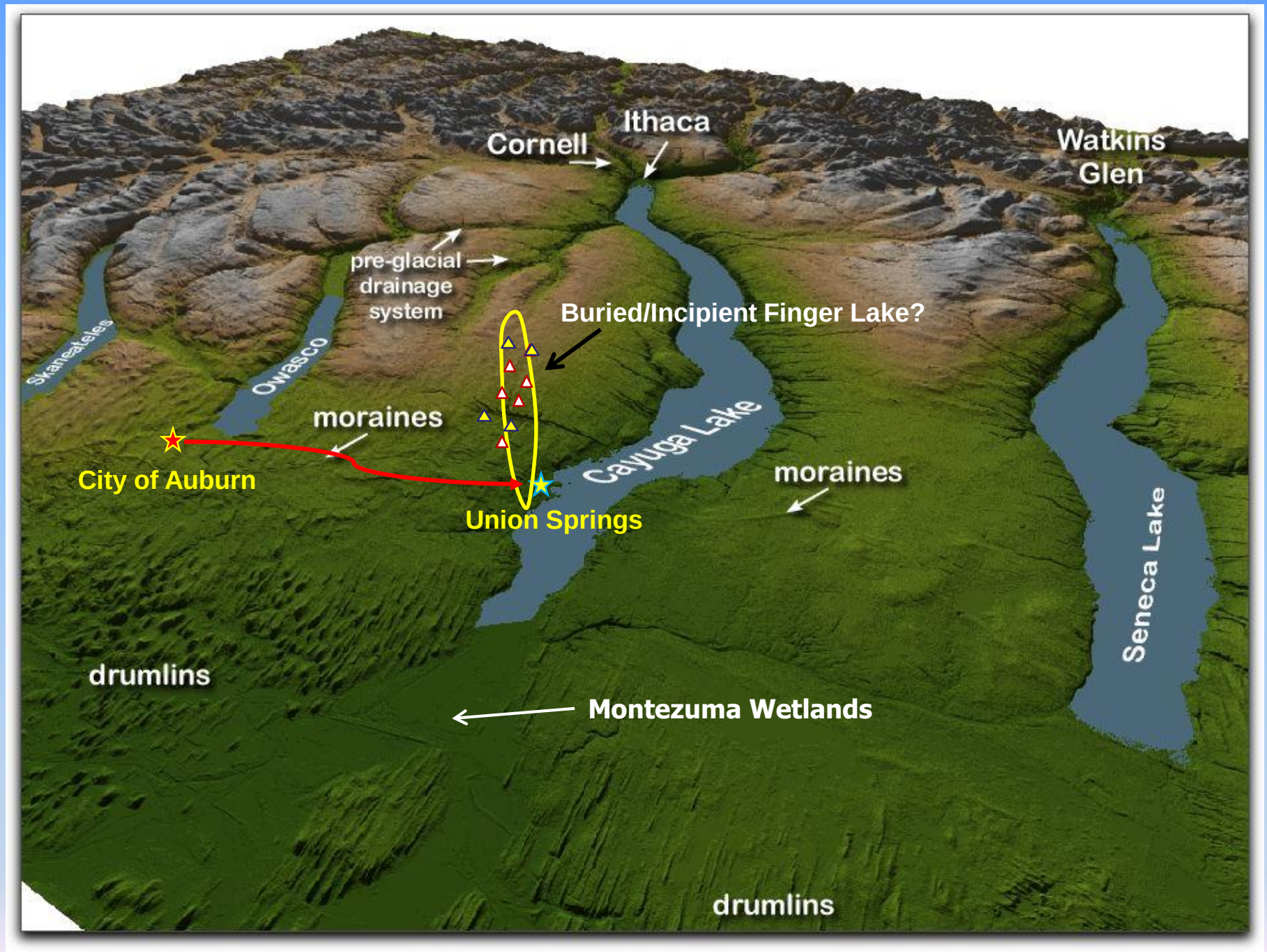
Core W3 230-240 cm Dryas

ka yrs

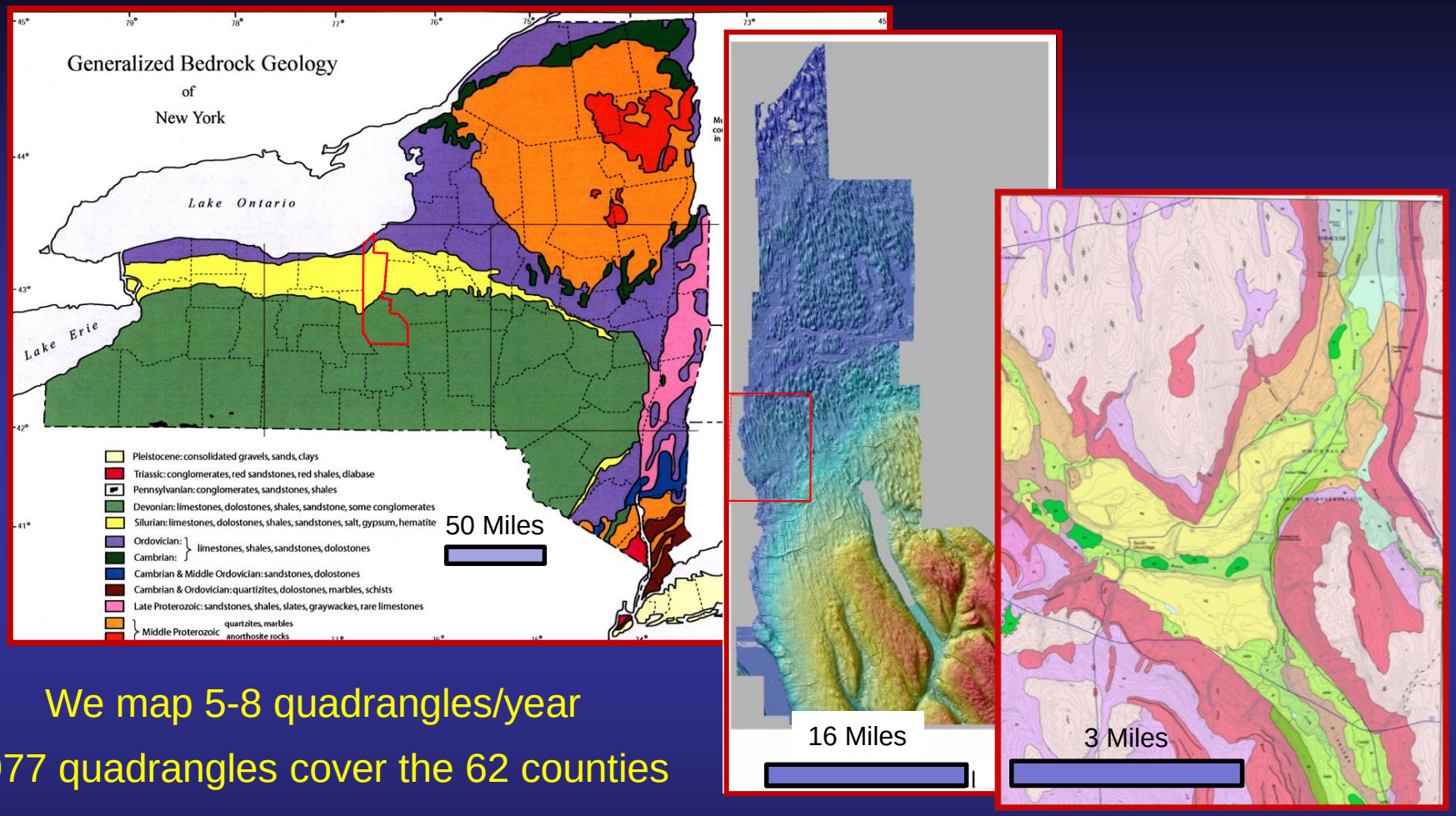
Plant fossils tell us about NY Climate History

Their Age tells us When!

Overlying till deposit indicates return to glaciation


Cornell
Ithaca
Watkins Glen
pre-glacial drainage system
Buried/Incipient Finger Lake?
Skaneateles
Owasco
moraines
City of Auburn
Union Springs
Cayuga Lake
moraines
Seneca Lake
drumlins
Montezuma Wetlands
drumlins

Data and Scale



We map 5-8 quadrangles/year

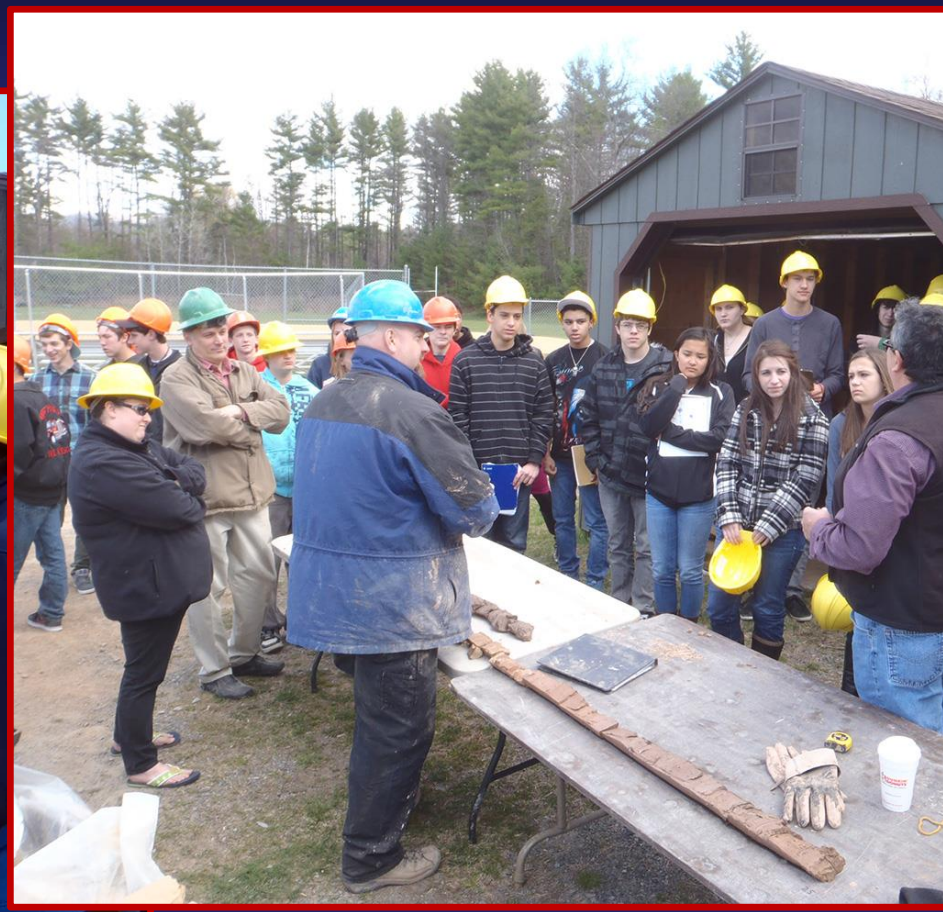
977 quadrangles cover the 62 counties

- You ***CANNOT*** use Statewide geologic maps to address County or Town scale Issues
- You can use quadrangle scale data to address County or Town scale Issues

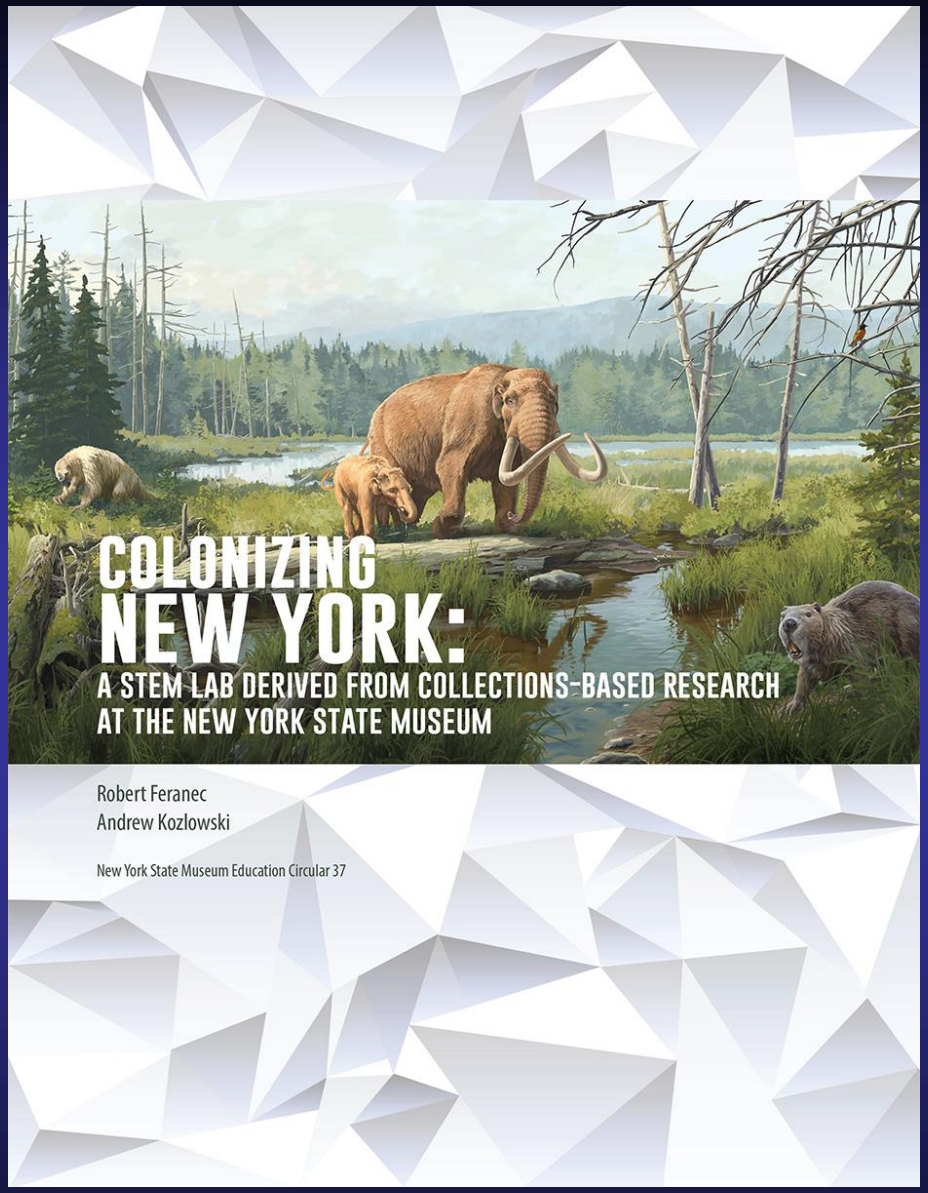
2014-16 NYSGS/NYSM Geologic Mapping Highlights

- **June 7- 8th NE Friends Of Pleistocene Meeting Held in Auburn, NY**

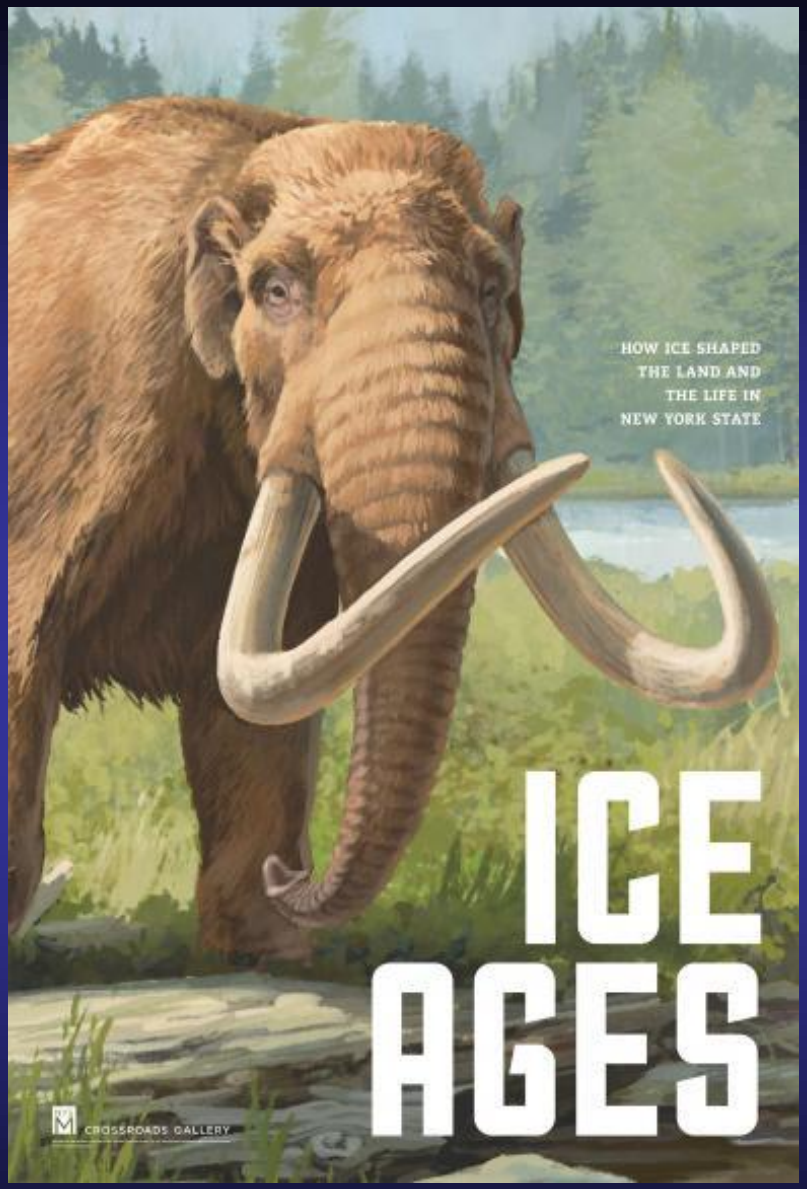
Teachable moments



Onteora Central School –
Ulster County



New Publication!

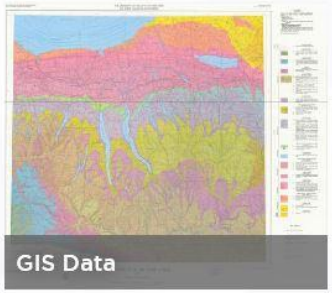


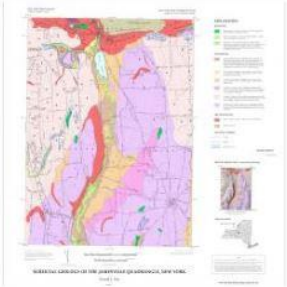
NEW Exhibit!

Map & Chart Series

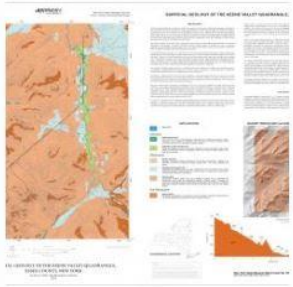
The Map and Chart Series, first introduced in 1960, combines large format graphics with associated text with emphasis on the graphic in lieu of descriptive text. The primary purpose of the series is to document surface and subsurface geologic data that are difficult to present in other formats. Many geologic maps are published in this series. Since 2006 geologic mapping at the New York State Museum has benefitted from cooperative federal partnerships. Traditional geologic mapping has been enhanced by technological developments such high resolution LIDAR terrain models. Many products contain both a surface map of geologic formations and materials as well as subsurface geologic cross sections. As you select a particular title or map you will have the option to open and download a high resolution PDF file. If you would like to request full-sized printed maps please contact Mr. Brad Seymour Brad.Seymour@nysed.gov.

See Also

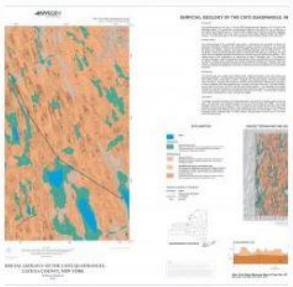




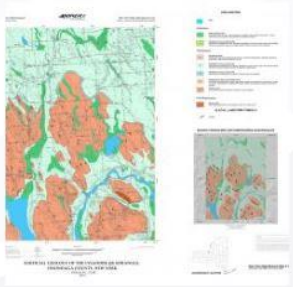
Surficial Geology of the Janesville Quadrangle, NY (5.03 MB)
Map & Chart No. 58
Download JPG Version



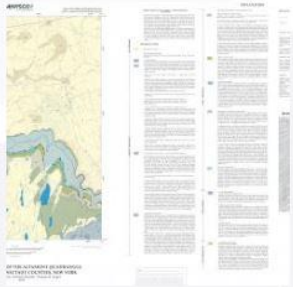
Surficial Geology of the Keene Valley Quadrangle, NY (32.9 MB)
Map & Chart No. 59
Download JPG Version



Surficial Geology of the Cato Quadrangle, NY (18.99 MB)
Map & Chart No. 60
Download JPG Version



Surficial Geology of the Lysander Quadrangle, Onondaga County, NY (11.8 MB)
Map & Chart No. 61
Download JPG Version



Bedrock Geology of the Altamont Quadrangle, Albany and Schenectady Counties, NY (24.96 MB)
Map & Chart No. 62
Download JPG Version

Scientific Validation and Credibility through the Peer Review Process

Quaternary Research 85 (2016) 262–270

Contents lists available at ScienceDirect

Quaternary Research

journal homepage: www.elsevier.com/locate/yqres

Implications of a Bayesian radiocarbon calibration of colonization ages for mammalian megafauna in glaciated New York State after the Last Glacial Maximum

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Research and Collections, New York State Museum, Albany, NY 12230, USA

ARTICLE INFO

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Bayesian calibration
Habitat tracking
Last Glacial Maximum
Mammal
New York

ABSTRACT

To understand what factors control species colonization and extirpation within specific paleoecosystems, we analyzed radiocarbon dates of megafaunal mammal species from New York State after the Last Glacial Maximum. We hypothesized that the timing of colonization and extirpation were both driven by access to preferred habitat types. Bayesian calibration of a database of 39 radiocarbon dates shows that caribou (*Rangifer tarandus*) were the first colonizers, then mammoth (*Mammuthus* sp.), and finally American mastodon (*Mammut americanum*). The timing of colonization cannot reject the hypothesis that colonizing megafauna tracked preferred habitats, as caribou and mammoth arrived when tundra was present, while mastodon arrived after boreal forest was prominent in the state. The timing of caribou colonization implies that ecosystems were developed in the state prior to 16,000 cal yr BP. The contemporaneous arrival of American mastodon with *Sporormiella* spore decline suggests the dung fungus spore is not an adequate indicator of American mastodon population size. The pattern in the timing of extirpation is opposite to that of colonization. The lack of environmental changes suspected to be ecologically detrimental to American mastodon and mammoth coupled with the arrival of humans shortly before extirpation suggests an anthropogenic cause in the loss of the analyzed species.

Introduction

Timing the colonization and extirpation of species within specific ecosystems is important for understanding how that ecosystem functions and evolves. Different factors, such as climate and competition are involved in determining when and whether particular species can colonize and establish in new geographic areas, which affects the ecological relationships that ultimately befall (Diamond, 1975; Lockwood et al., 1997; Weiher and Keddy, 2001; Young et al., 2001; Chase, 2003; Svenning and Skov, 2004; Ricklefs, 2008; Thibault and Brown, 2008; Lavergne et al., 2010; Chase and Myers, 2011; Weiher et al., 2011; Jackson and Blois, 2015). Establishment and loss of particular species in an ecosystem affects the ecological interactions involving not only the potential colonizing species but also incumbent species and possible future colonizers (Belyea and Lancaster, 1999; Young et al., 2001; Chase, 2003; Fukami et al., 2010; Weiher et al., 2011). This has important ecological and evolutionary implications regarding ecosystem composition and diversity.

Numerous studies examining species colonization and assembly within communities have focused on modern ecosystems (e.g., Cody and Diamond, 1975; Strong et al., 1984; Weiher and Keddy, 2001), and these necessarily concentrate on examining shorter-term factors that influence establishment within ecosystems (although see Jackson et al., 1997; Jackson and Blois, 2015; Webb, 1987; Williams et al., 2001, 2004). It is rare to have an opportunity to examine the timing of colonization and ecosystem assemblage at longer time scales. Many longer term studies have focused more on how species biogeographic ranges changed over time, and, particularly, how they react to climate change, than on determining the exact timing of colonization for species within a particular ecosystem (Wright, 1964; Ashworth et al., 1981; Davis, 1983; Schwert, 1992; Graham et al., 1996; Davis and Shaw, 2001; Lyons, 2003; Pearson and Dawson, 2003; Moritz et al., 2008; Chen et al., 2011).

Precisely identifying the timing of colonization within ancient ecosystems can be difficult. Dating is generally performed on a stratigraphic unit containing fossil specimens rather than on the individuals, and time averaging within the unit makes it largely impossible to determine whether one species arrived earlier or later than another within a specific paleoecosystem. Further, most dating techniques are generally not precise enough to determine whether a species arrived earlier or later than another. Knowing species colonization times within a particular ancient ecosystem permits comparison to the biotic and abiotic conditions present at the time. If the timing of extirpation can also be determined, additional ecological information such as how long species interacted and/or whether extirpation correlated to particular

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http://dx.doi.org/10.1016/j.yqres.2016.01.003
0033-5894/

Since 2006

14 scientific papers

60 Maps

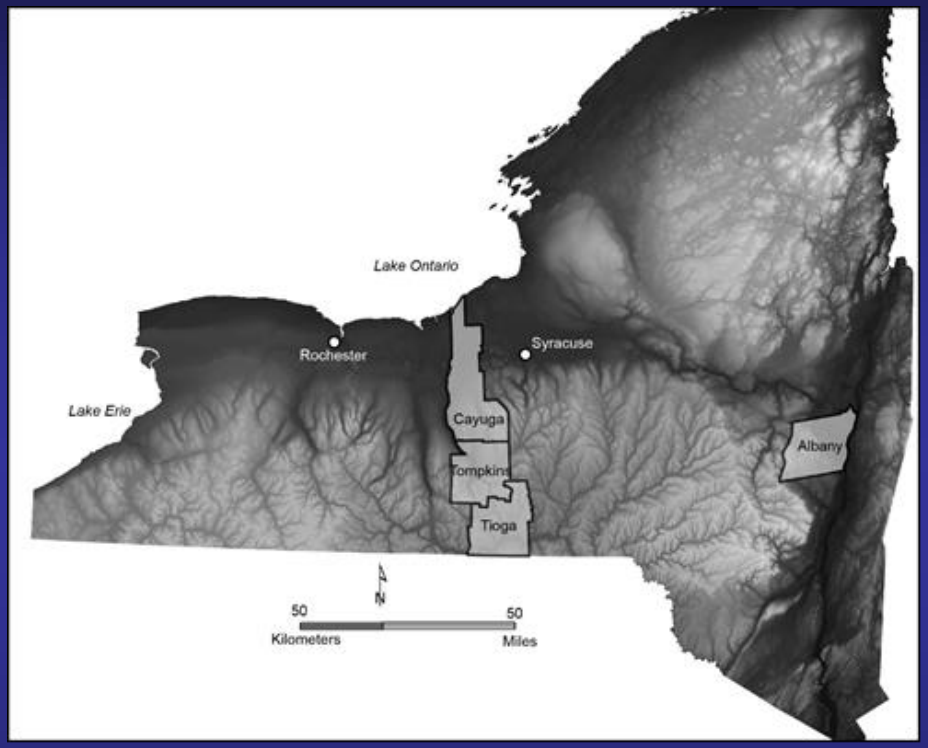
4 field guides

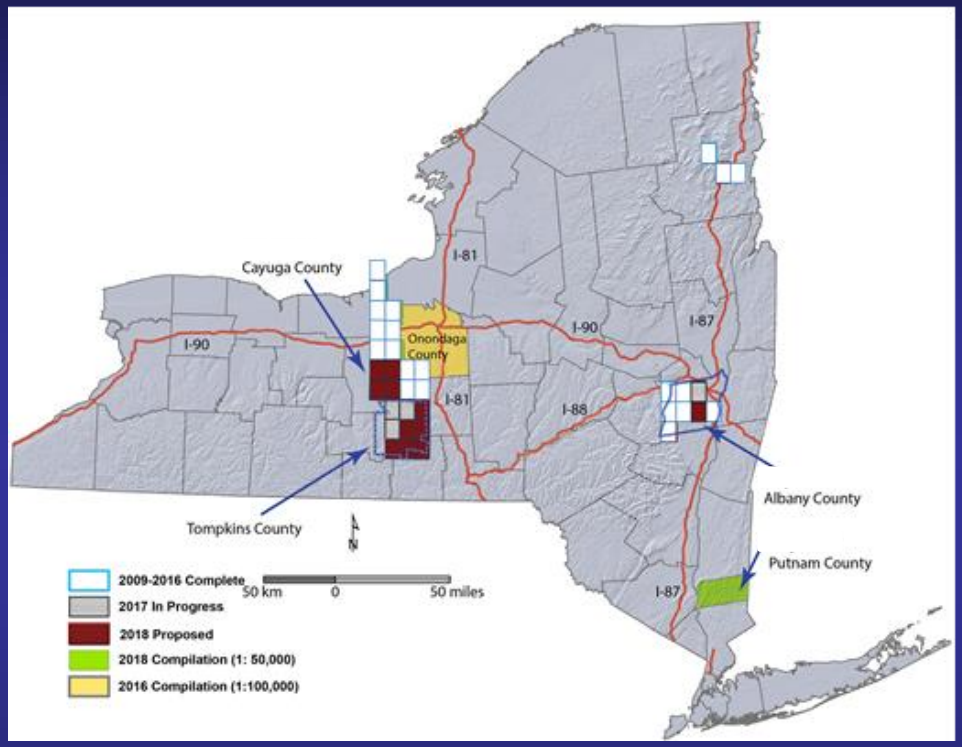
11 Teacher workshops

26 Internships

Licensed Professional Certification

Long-term Mapping Objectives and Mapping Status



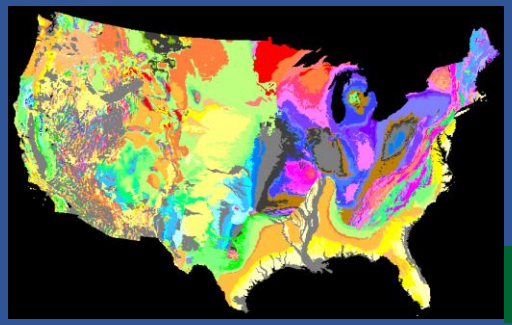


With the completion of Cayuga County in 2018 we aspire to complete mapping in Tompkins County by 2022 and Tioga County by 2028, thus providing a continuous geologic framework from Lake Ontario to the Pennsylvania Border.


Thanks

STATEMAP PROVIDES

- **Funds to hire geologist and contract staff**
- **Funds to contract drilling & excavation services**
- **Funds to purchase field equipment**
- **Funds to purchase lab supplies**
- **Funds to purchase chemical analyses**
- **Funds to contract age dating services**
- **Funds to travel to field sites and meetings**



USGS

NCGM Program Components

- **FEDMAP—USGS geologic mapping projects**
- **STATEMAP—State geological survey projects (each federal dollar matched by state dollar)**
- **EDMAP—Training the next generation of geologic mappers**

- **National Geologic Map Database—improves access to geologic maps on the Internet**

USGS

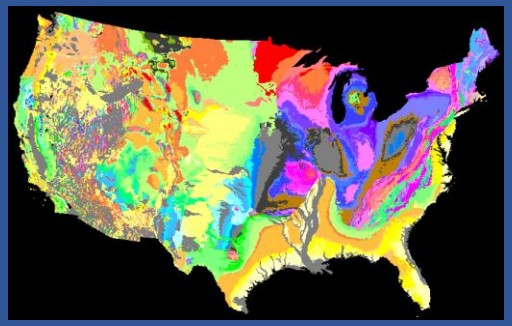
Organizational Structure

U.S. Department of the Interior

- United States Geological Survey

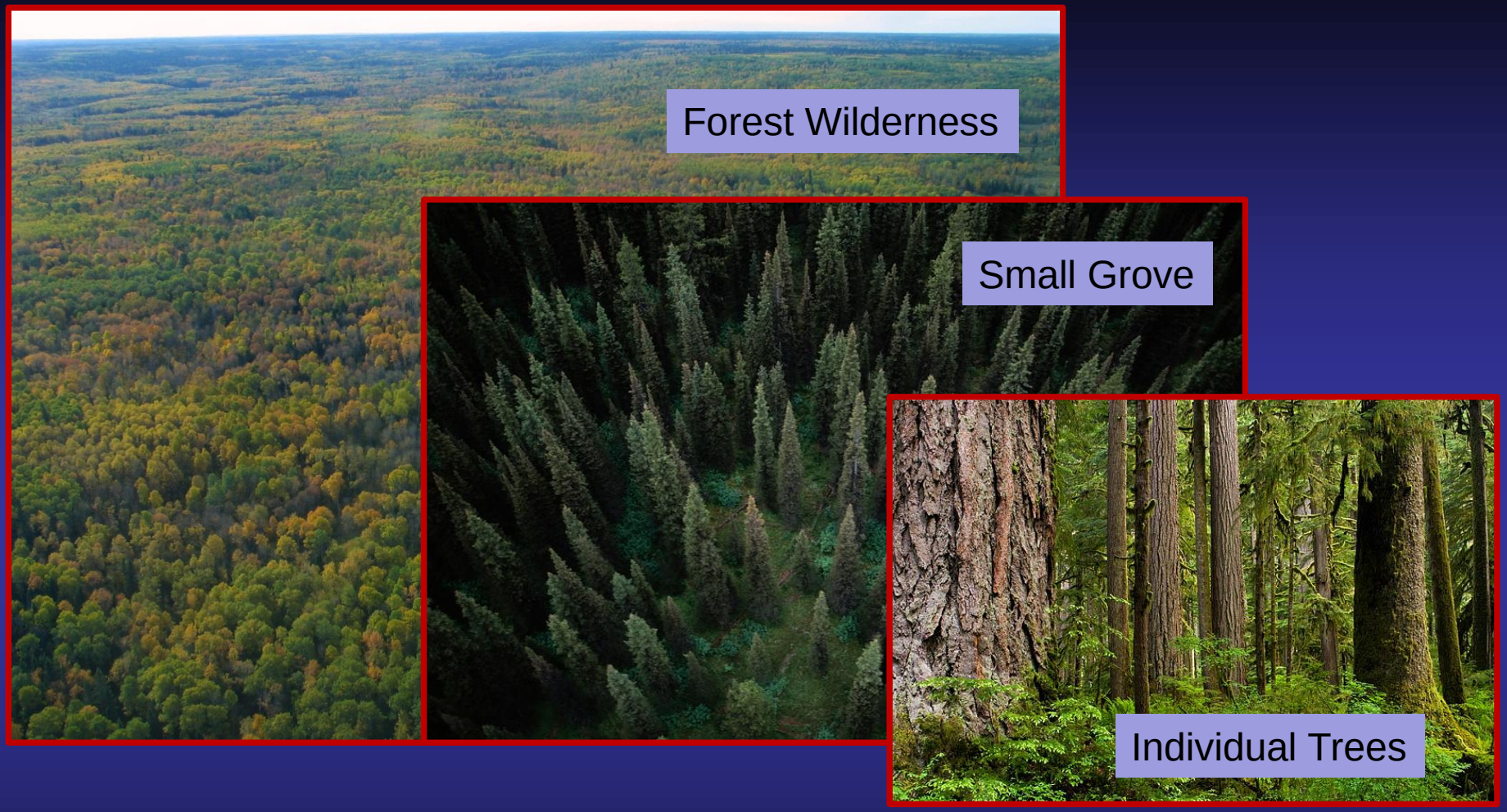
- National Cooperative Geologic Mapping Program (NCGMP)

- FEDMAP ($20 Million)
- STATEMAP ($6 Million)
- EDMAP ($1 Million)



USGS

Data and Scale



- You cannot evaluate the individual health of a tree by a viewing a forest wilderness
- You are able to evaluate the health of a grove if you examine the individual trees