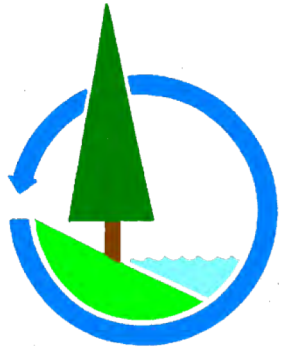
SUNY ONEONTA



Biological Field Station
Cooperstown, NY

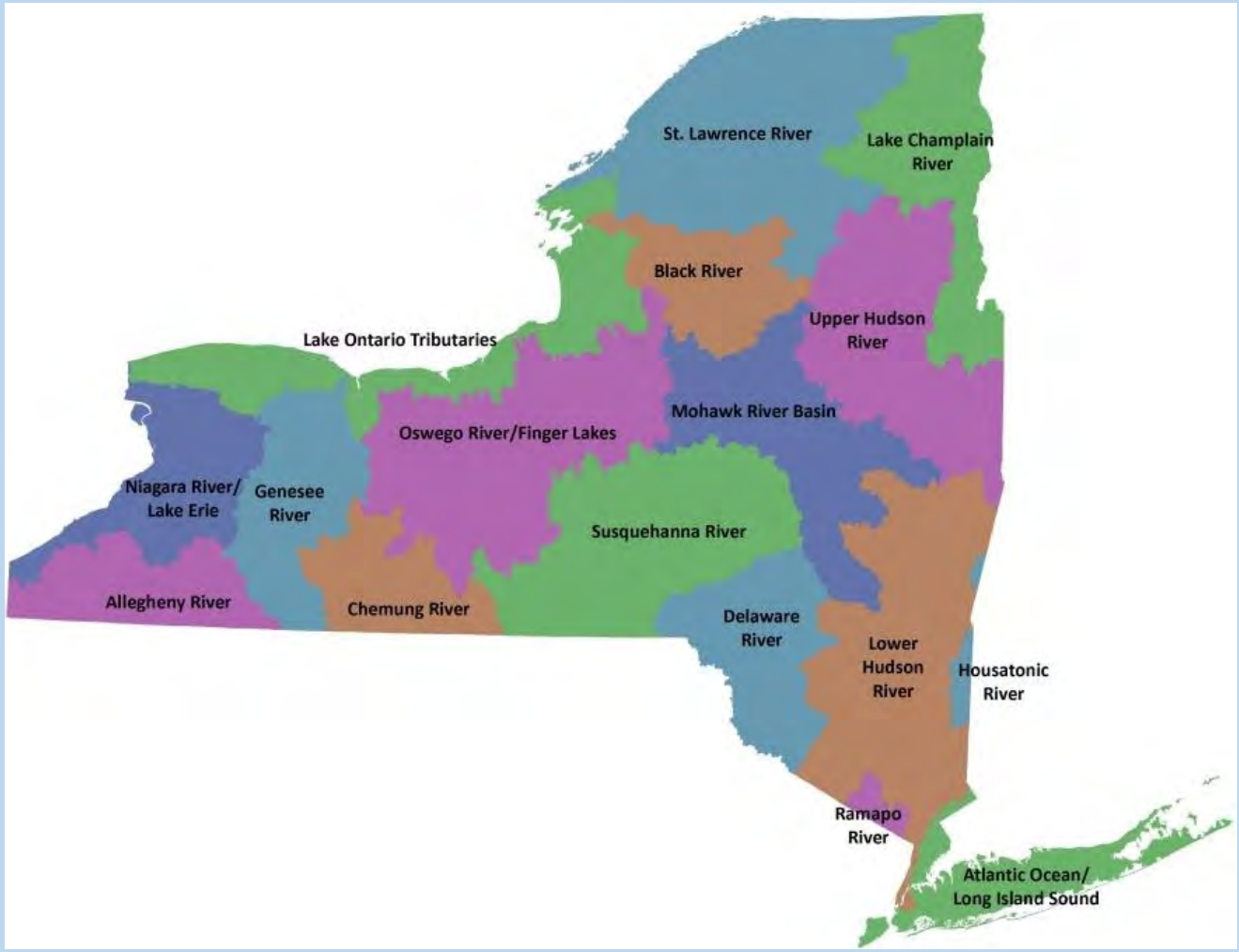
What are watersheds, how they are managed and their roles in sustainable lake water quality.

Dr. Willard N. Harman, CLM
Ms. Heather Murphy, PSM Degree Student
Biological Field station, Cooperstown, NY

Outline of presentation:

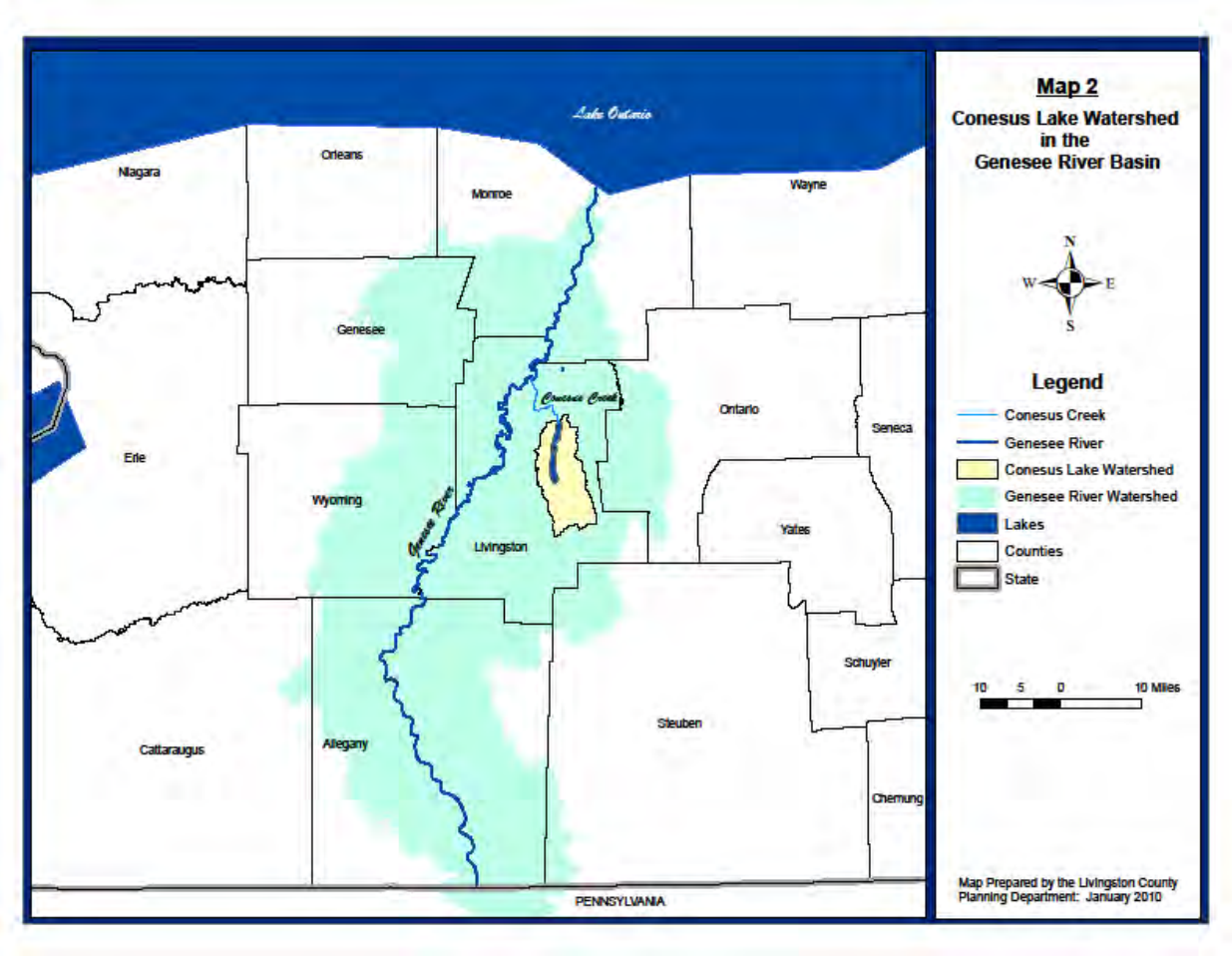
What is a Watershed?
How we delineate watersheds or Drainage Basins
Why there are problems with those methods?
What difference does it make?
An example (Phosphorus runoff) is provided.
How are lakes impacted?
How do we mitigate the problems?
BMPs to Lakescaping and back again
Implementation of BMPs

New York State Watersheds



Note the Genesee

Genesee River Drainage Basin showing Conesus Watershed



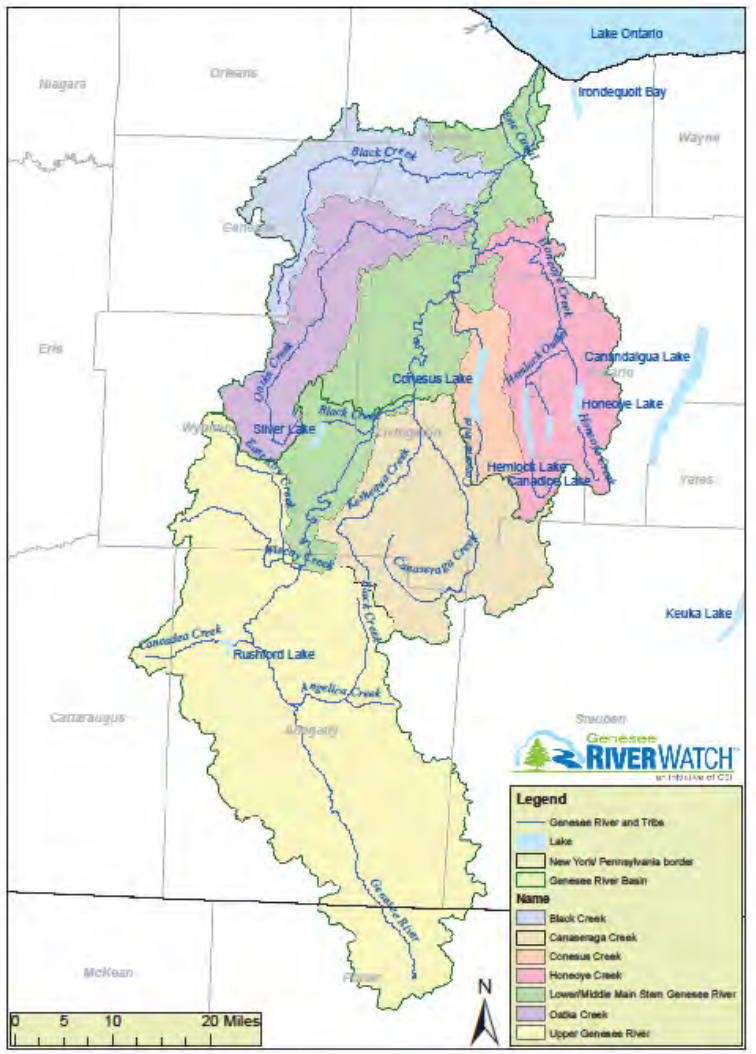
Definition: A region or area bounded by a divide and draining ultimately to a particular watercourse or body of water

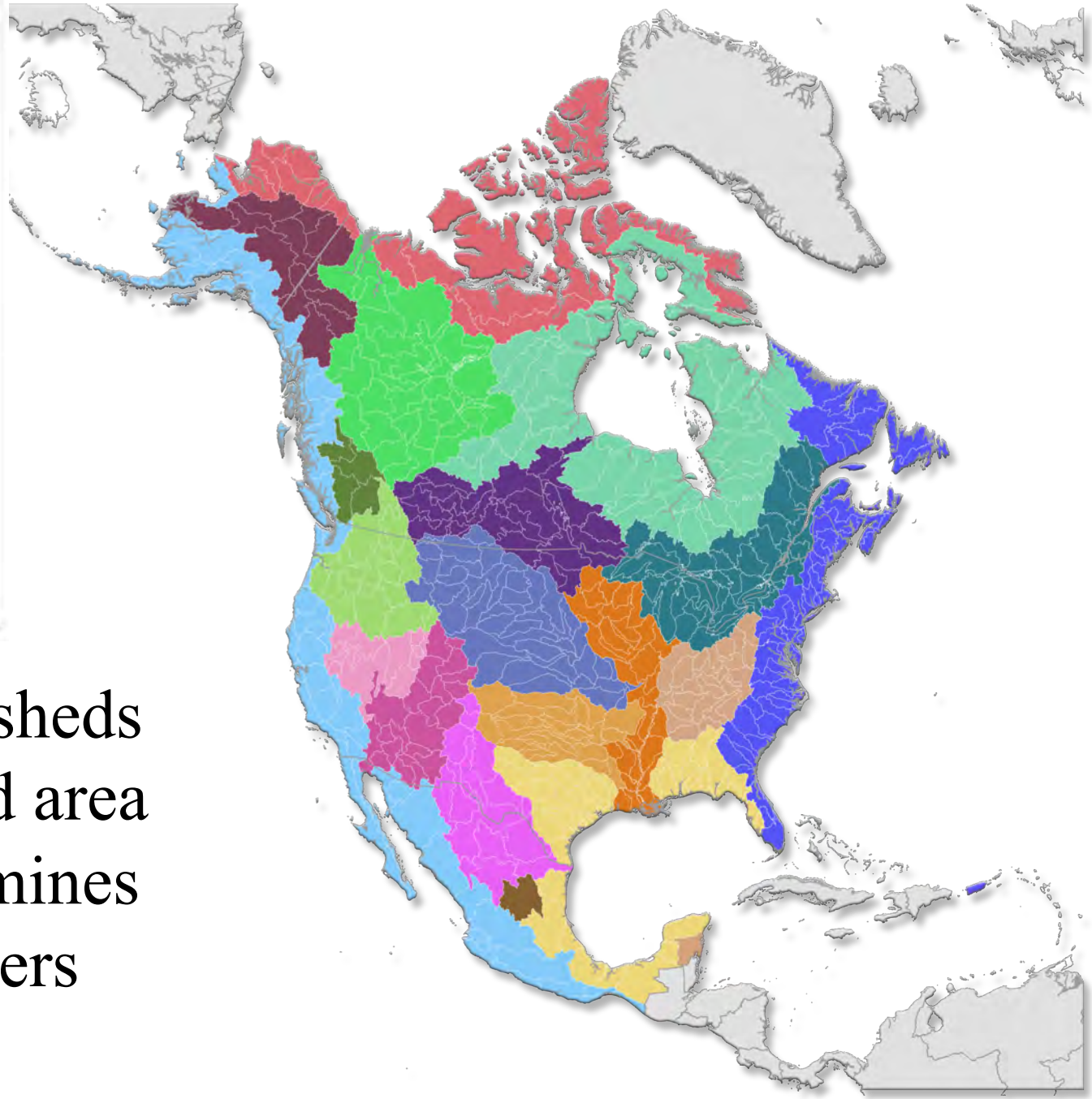
The Genesee Drainage Basin in more detail

Conesus Creek Drainage Basin including

Conesus Lake Watershed

(in orange)



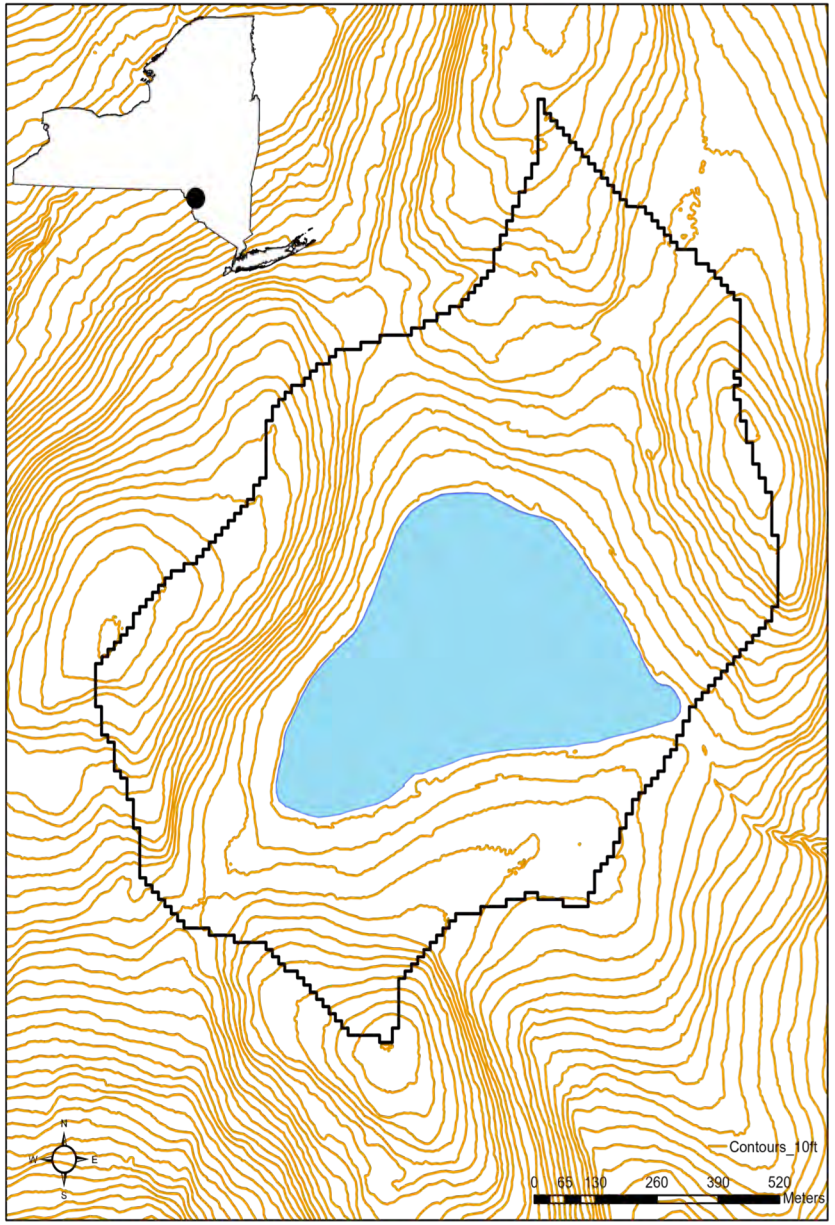


You can determine large watersheds and smaller ones, but watershed area ratio to lake surface area determines its importance to lake managers

Anawanda Lake Watershed

All precipitation in the watershed flows to the lake.

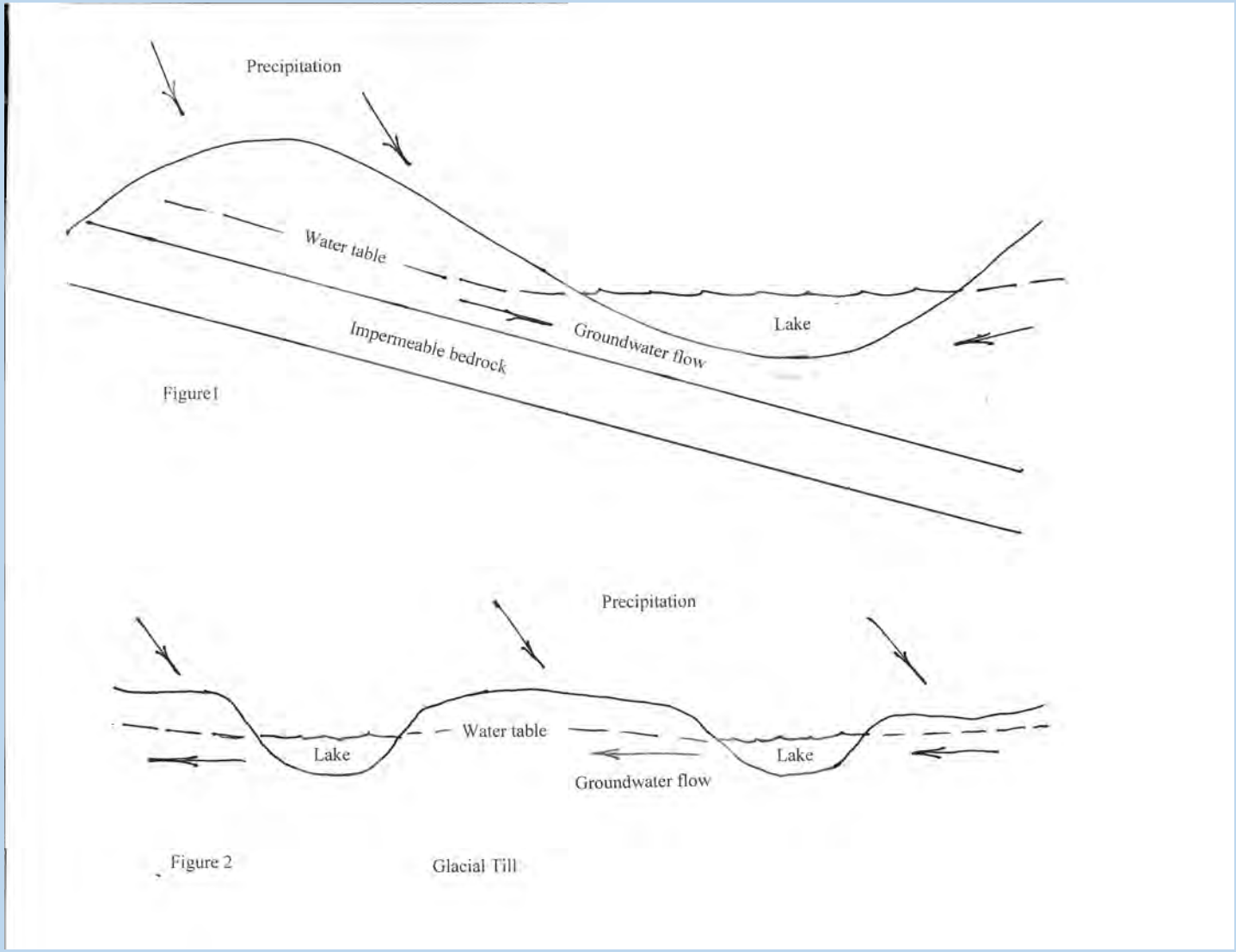
Note contour lines. Boundary follows the highest hilltops, but does it really?



Why the usual delineation of watershed boundaries may not be accurate

Figure 1. Impermeable rock layers

Figure 2. Groundwater flow regulated by other than surficial characteristics of soils



Tully Kettle lakes

Blue line = watershed boundary

Red lines = groundwater elevations

Blue arrows = groundwater flow which has little to do with surface elevations

The dashed line represents the groundwater divide between the Oswego and Susquehanna watersheds.

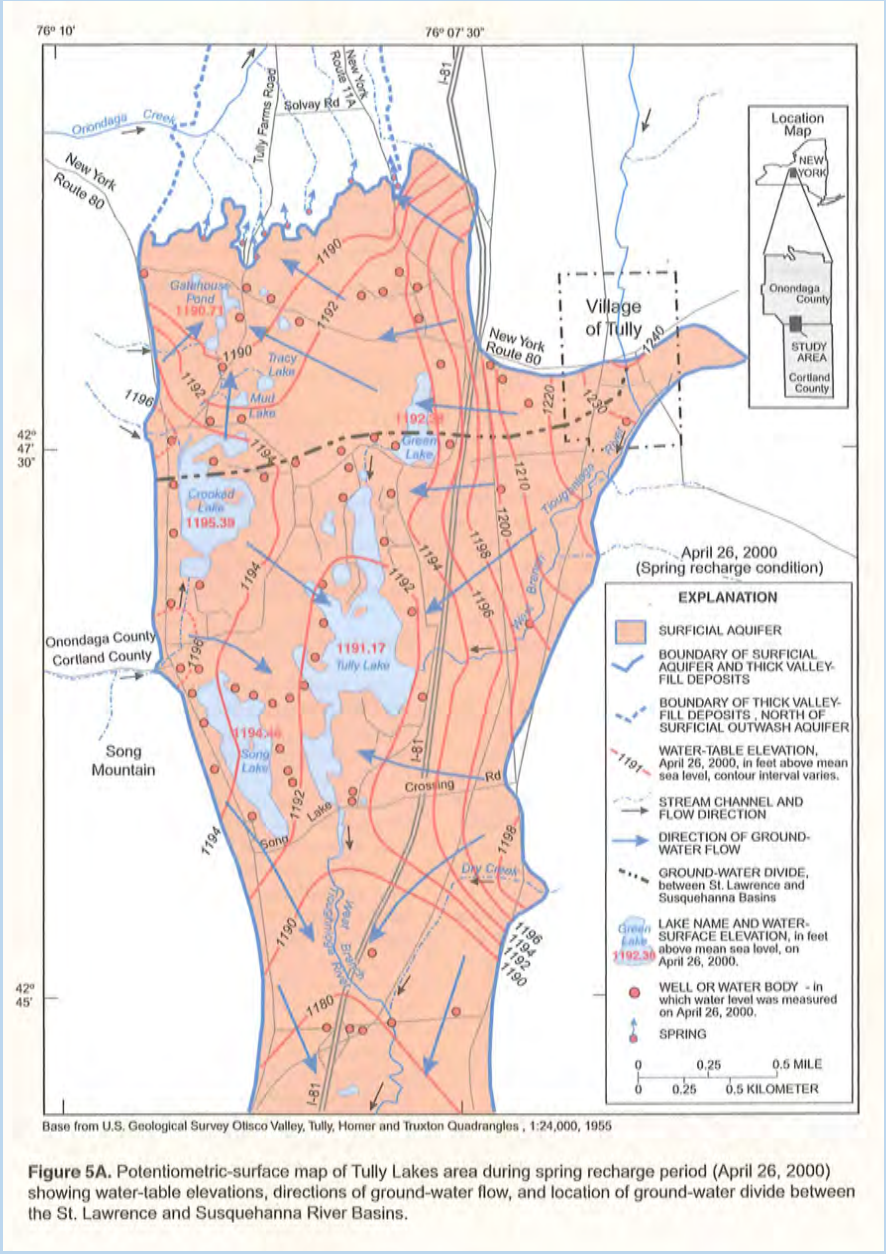
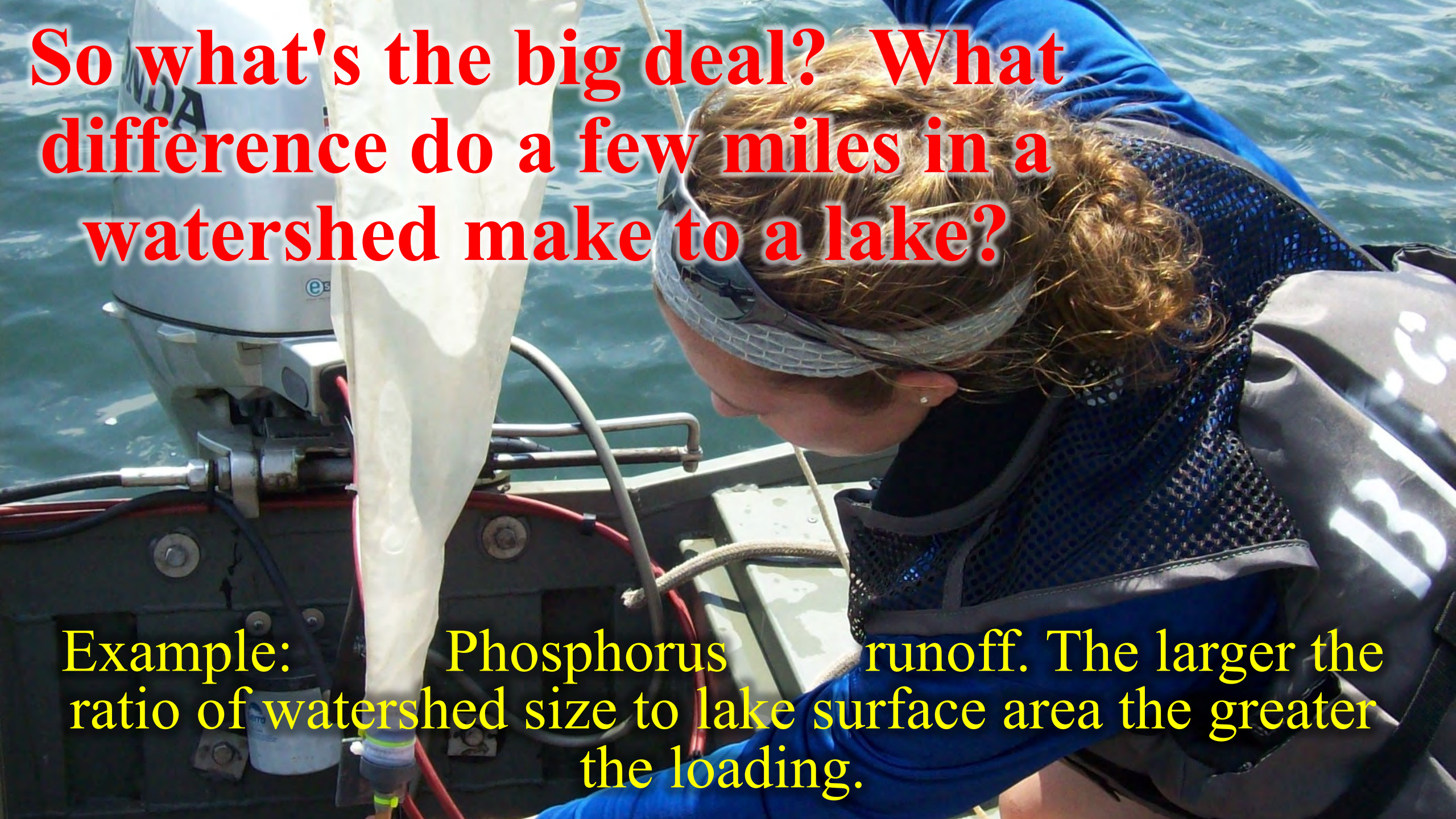


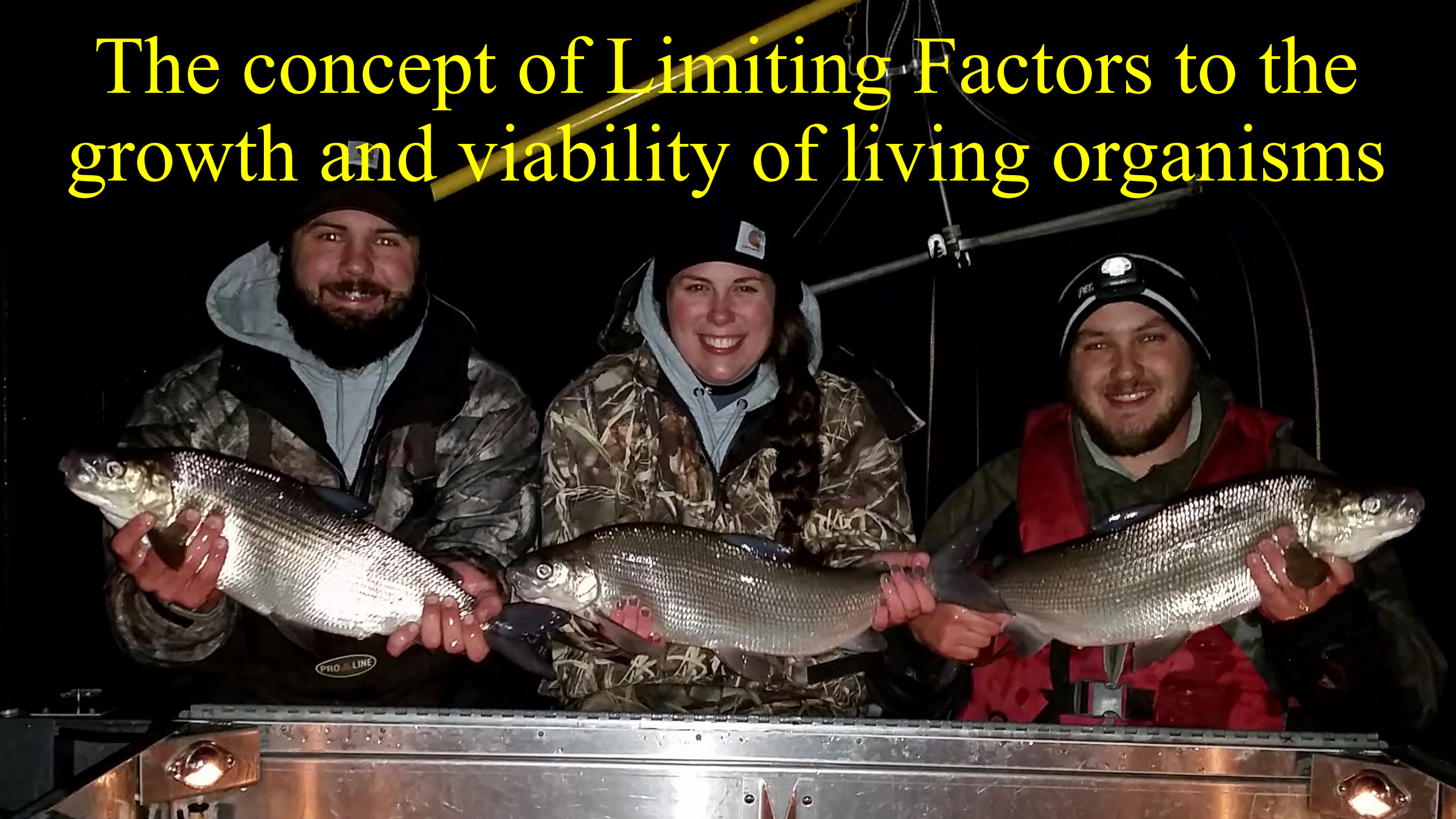
Figure 5A. Potentiometric-surface map of Tully Lakes area during spring recharge period (April 26, 2000) showing water-table elevations, directions of ground-water flow, and location of ground-water divide between the St. Lawrence and Susquehanna River Basins.



So what's the big deal? What difference do a few miles in a watershed make to a lake?

Example: Phosphorus runoff. The larger the ratio of watershed size to lake surface area the greater the loading.

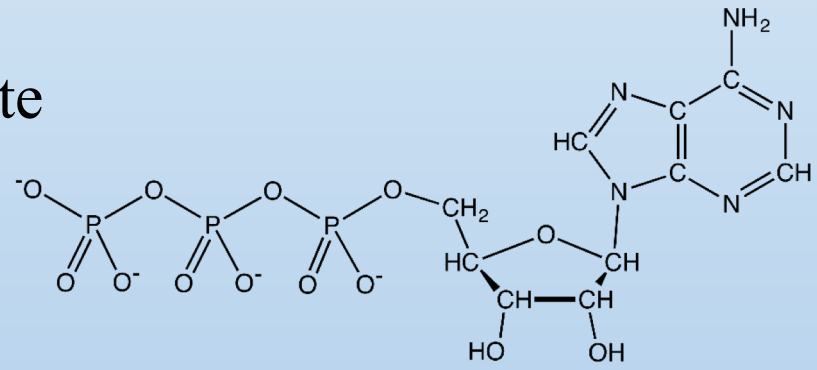
The concept of Limiting Factors to the growth and viability of living organisms



Phosphorus is the limiting factor to aquatic plant, algal and cyanobacteria population sizes in most inland lakes

(a fertilizer that increases garden productivity)

Adenosine triphosphate
found in all foods



Too much Phosphorus =
Too many plants and/or algae
for optimal recreational use.
The worst case: Too many
cyanobacteria = HABs

Problems can be solved in the long run by reducing phosphorus runoff by protecting sensitive areas and implementing watershed BMPs

Emergency short term solutions require in-lake management strategies which get extremely expensive over the long run

Warning!

Watershed Best Management Practices take a long time to plan, implement and to get positive results

Protect high priority areas

Groundwater Recharge Areas

Steep Slopes

Wetlands, Vegetated Bays

Sensitive Soils (Over-permeable, Impermeable)

Already Impacted Areas (compacted surfaces, wetland loss, channelized and dammed streams, roadside ditches, drainage from residential sites and bare fields)

Large numbers of BMPs

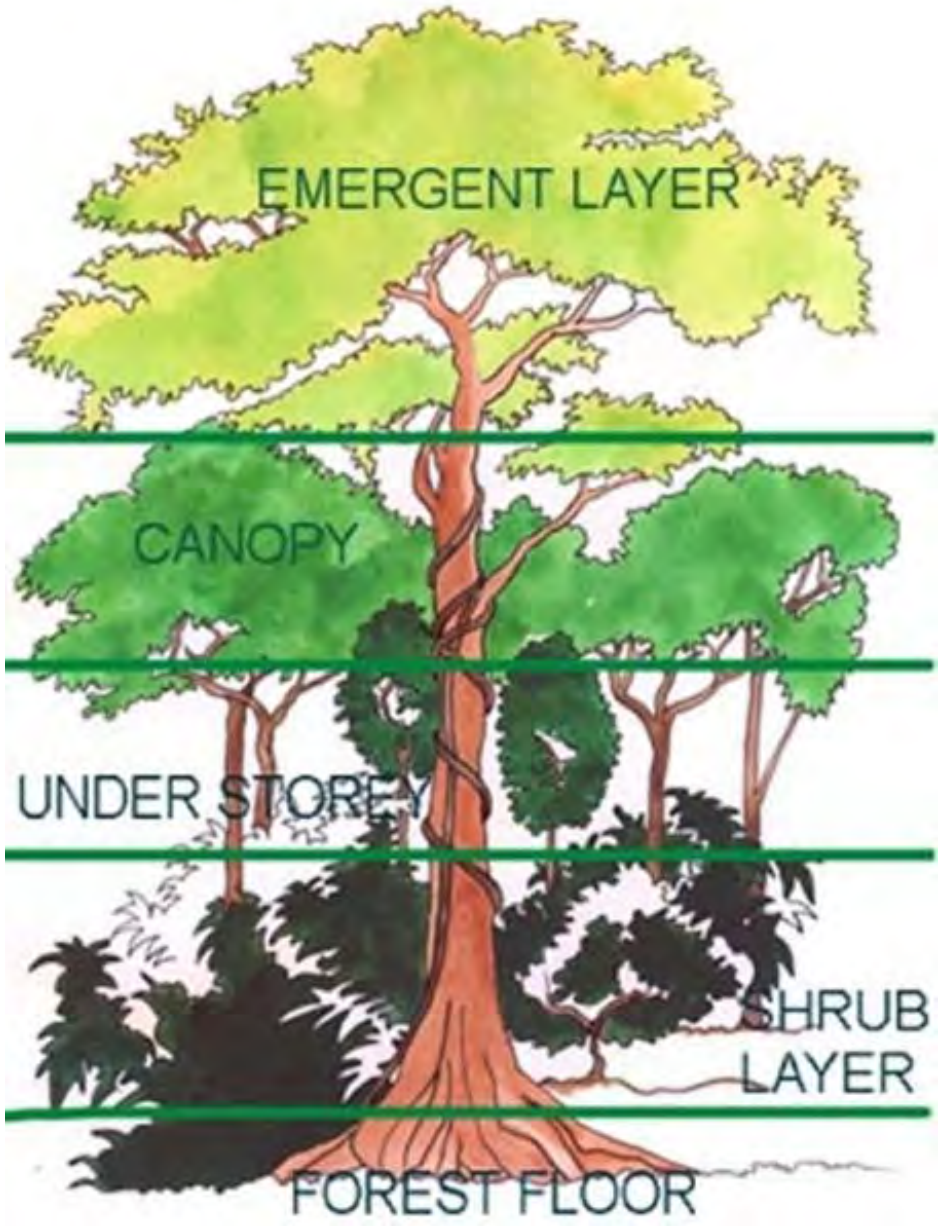
Agricultural, silvicultural, construction, residential, stormwater, etc.

Dozens of BMPs: feedlots to stream buffers, swales to water gardens, rain barrels to sediment basins, etc.

Technical manuals available to engineers, planners, highway superintendents, agribusinesses, contractors, foresters, anyone who is working on the land.

Many become familiar with a few and ignore all the rest

In a pristine situation in the northeast forested lands retain phosphorus most effectively




Forestry


Riparian


CLAWSON PARK STORMWATER
Stormwater


COVER CROPS
FOR HEALTHY LAKES
farmcredit
Agricultural

Lakescaping

First impressions vs. the reality

You can apply lakescaping principles to complete yards as well as implementation of construction BMPs

Further away from a lake more Construction BMPs or or lack thereof

Even further afield

Onsite Sanitary Waste Disposal Systems as simple as raised beds to highly engineered facilities are important residential BMPs

Implementing Agricultural BMPs

Federal monies for Agricultural BMPs via Soil and Water Conservation Districts working with the FSA and NRCS.

Voluntary Programs

Matching funds often required

Matching funds

Lake Groups can provide incentives

Funding sources to help farmers.

Implementing other watershed BMPs

Most of the diversity of BMPs via Town Law and/or local Land Use Regulations.

Because the latter often require educational efforts and life style changes, implementation can be a long and frustrating process.

Work with
Town Planning Boards
and other local government officials

1. Education and a strategy to move forward to implement lake friendly regulations
2. First, get those approved that do not impact watershed stakeholders such as engine size, boat speed , noise levels
3. Then lakeside strategies such as lakescaping, on-site wastewater system inspections, lake protection districts, response to crises
4. Then tributary BMPs
5. Then aquafer protection districts

The End^2

Photo Credit

Rain cloud - https://i.pinimg.com/originals/eb/62/f5/eb62f5d701dccbf6c23162a141cbd5db.png

Forested Lakeshore - https://chautauquawatershed.org/2019/02/28/wells-bay-lakeshore-forest-preserve/

Into and Final slides - https://www.hollygreenleaf.com/

No mow zone - https://www.nrdc.org/stories/more-sustainable-and-beautiful-alternatives-grass-lawn

Lawn to Lake - https://www.cleanairgardening.com/8-easy-ways-to-improve-your-lawn-3/

Conventional Septic - https://www.epa.gov/septic/types-septic-systems

Mound Septic - https://www.epa.gov/septic/types-septic-systems

Driveway erosion - https://en.wikipedia.org/wiki/Rill

Driveway water bars - https://www.uwsp.edu/cnr-ap/UWEXLakes/Pages/resources/WiLakeshoreRestorationProject/techniques.aspx

Five tiers of vegetation - https://www.geoforcxc.com/natural-systems/weather-and-climate/ecosystems/equatorial-climate/

Lake Friendly Property - https://www.vpr.org/post/hanson-lake-wise#stream/0

Unfriendly Lake Property - https://www.vpr.org/post/what-vermont-property-owners-need-know-about-new-shoreland-protection-act#stream/0

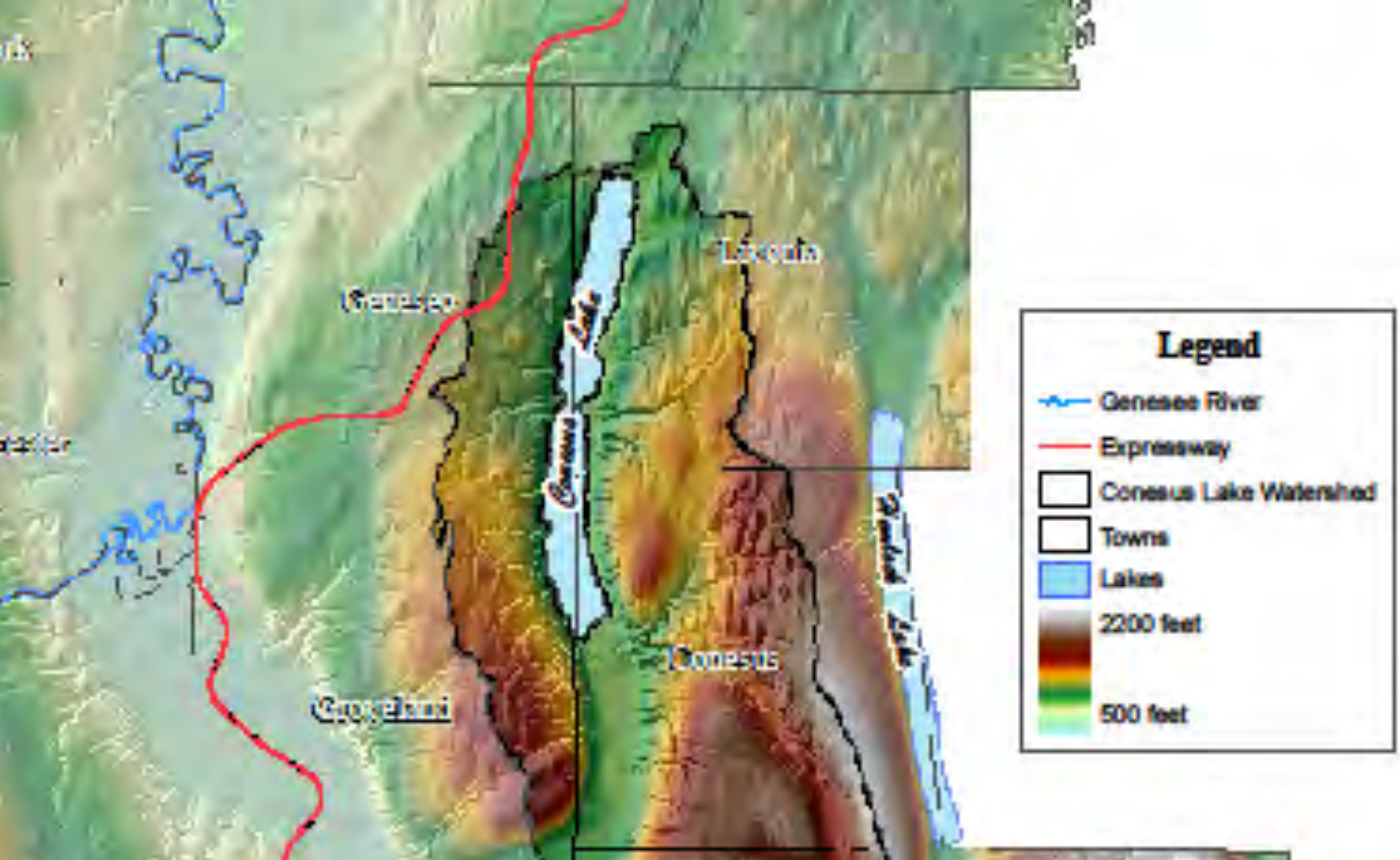
Watersheds of North America - https://www.usgs.gov/media/images/watershed-map-north-america

STATE UNIVERSITY OF NEW YORK
COLLEGE AT ONEONTA

BIOLOGICAL FIELD STATION

COOPERSTOWN, NY


No Farms
No Food
American Farmland Trust
A
Lake-Friendly
Farmer
Lives
Here!
Oswego County Water Quality Coordinating Committee


Legend
Genesee River
Expressway
Conesus Lake Watershed
Towns
Lakes
2200 feet
500 feet
Livonia
Conesus
Groveland


Conesus Lake Watershed
in New York State
CANADA
Ontario
Lake Ontario
Lake Erie
New York
Vermont
New
Hampshire
Massachussetts
Connecticut
New Jersey
Pennsylvania
Rochester
Syracuse
Buffalo
Livingston
County
Albany
Binghamton
New
York
N
W
E
S
Legend
Interstate Highways
Livingston County
States
Conesus Lake Watershed
Finger Lakes
0
50
100
Miles