www.erh.noaa.gov/nerfc/basin_info/OWSN6.html

Owasco Lake: The 2010 Update

Owasco Lake Watershed Association August 4th, 2010, Meeting

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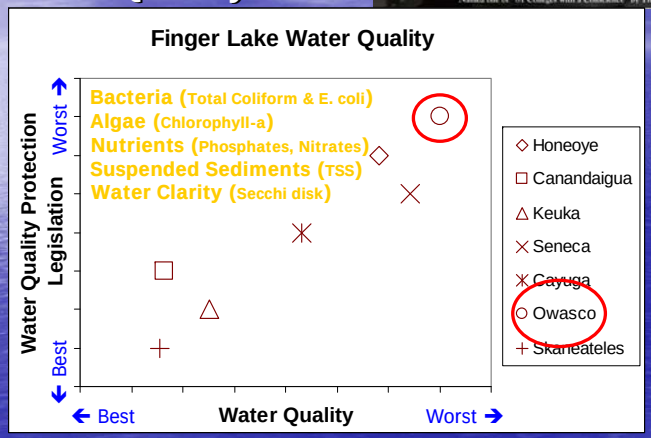
Environmental Studies Program
Department of Geoscience
Finger Lakes Institute

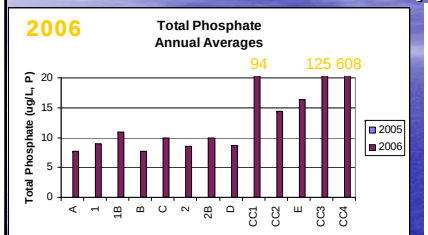
2005 Data Water Quality & Its Protection

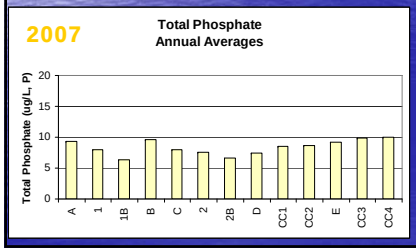


Bush, 2006, Undergraduate Honors Thesis

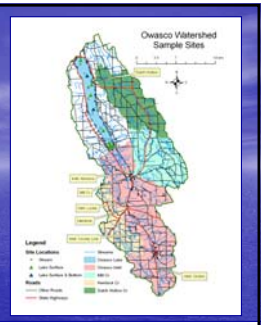
Owasco Lake Phosphates (TP)

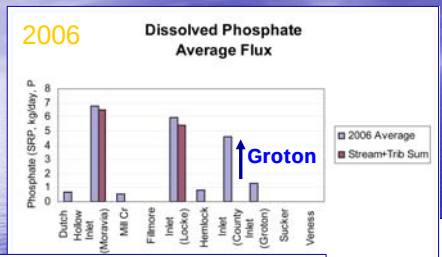
2006 Emerson Foundation Funds
2007 NYS Funds – Senator Nozzolio

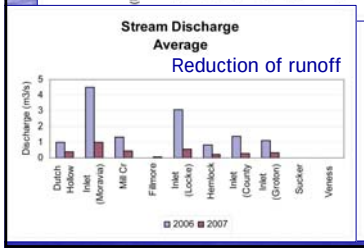


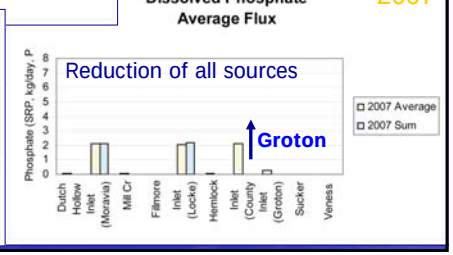


2006 & 2007 Stream Data









Water Quality Concerns

Runoff from:

- Human Wastes
  - Municipal Wastewater
  - On-Site Septic Systems
- Lawn Care Products
  - Fertilizers, Herbicides/Pesticides
- Animal Agriculture "CAFO" Operations
  - Steroids & Antibiotics
  - Animal Waste
- Plant Agriculture
  - Fertilizers, Herbicides/Pesticides
  - Soil Erosion

Ecological Health? Nutrient Cycle

Streams, Rain

Plankton

Dissolved Nutrients

Outlet

Bacterial Decomposition

Fish (Lake Trout) & Other Organisms

Dead Organics

Sediments

Lake Trout *(Salvalinus namaycush)*

Human Impact: Nutrient Cycle

Agricultural Fertilizers
Animal Feedlots
Wastewater Nutrients
On-Site Systems

Streams, Rain

Dissolved Nutrients

Plankton

Algae Scum Weeds

Outlet

Eutrophication Anoxia?

Fish (Lake Trout) & Other Organisms

Bacterial Decomposition

Dead Organics

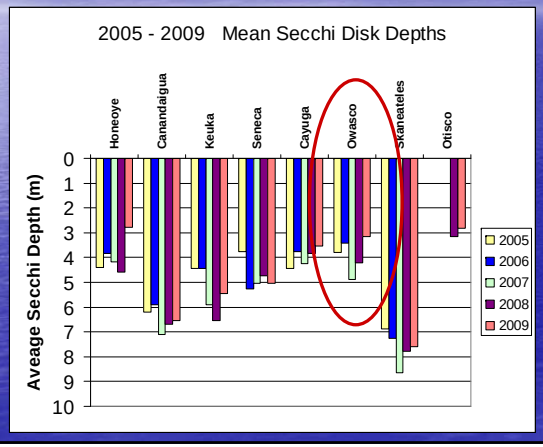
CAFO, Human & Soil Particle Organic Matter

Sediments

"Bottom Up" Approach

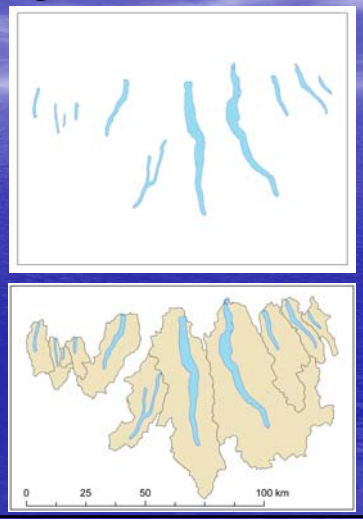
2005 to 2009 Data
Annual Mean Secchi Disk Depth

Shallower Depths (more turbid) in 2009



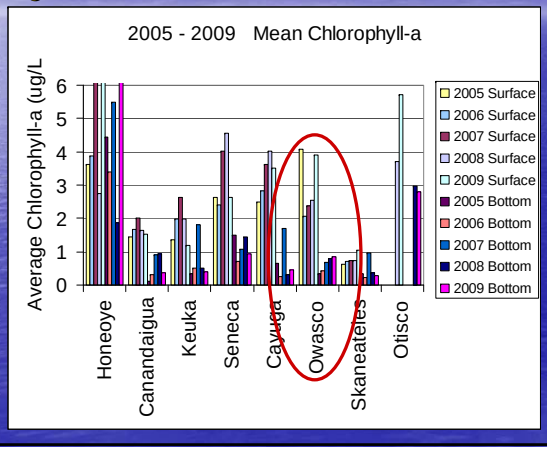
Which is the Largest Finger Lake?

- Canadice
- Canandaigua
- Cayuga
- Conesus
- Hemlock
- Honeoye
- Keuka
- Seneca
- Skaneateles
- Otisco
- Owasco

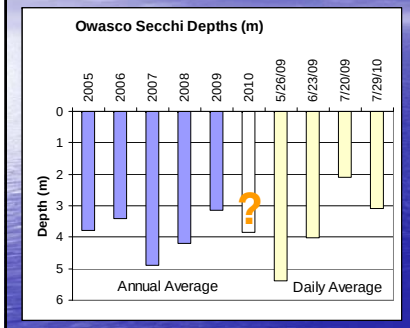


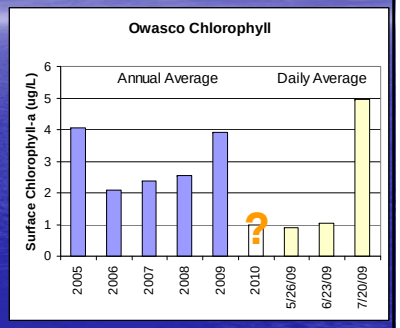
2005 to 2009 Data
Annual Mean Chlorophyll Data

More algae in 2009 surface water



Add 2010 Lake Data

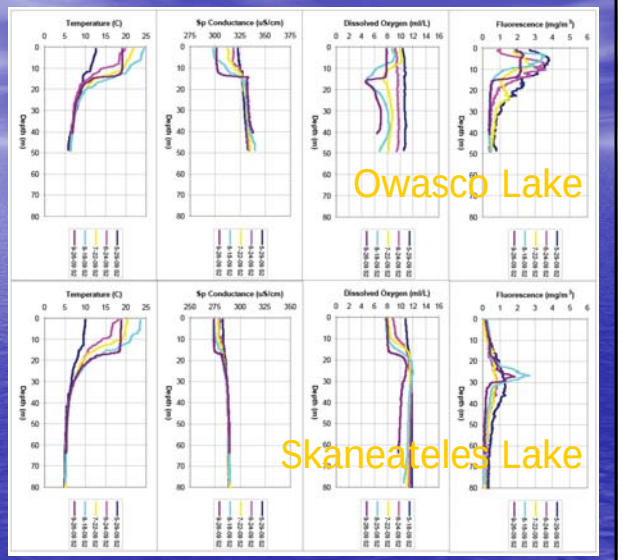




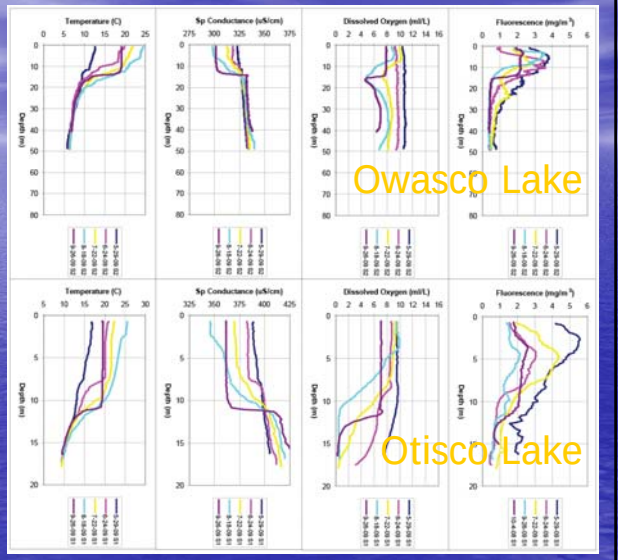
Beware: 2010 Data Incomplete

7/29/10 sampling - plea from Dr. Joe...

2009 CTD Data

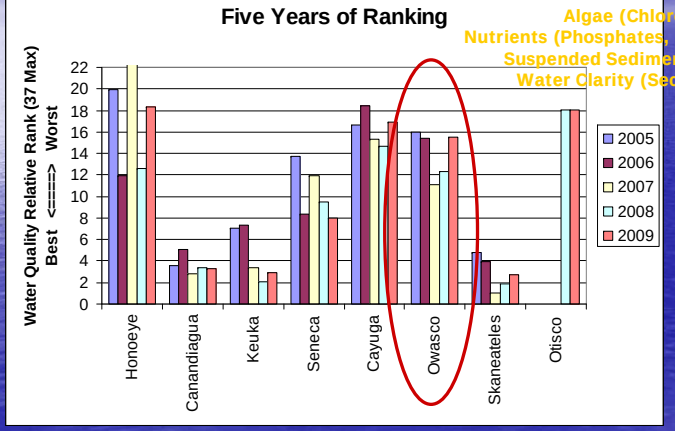


2009 CTD Data

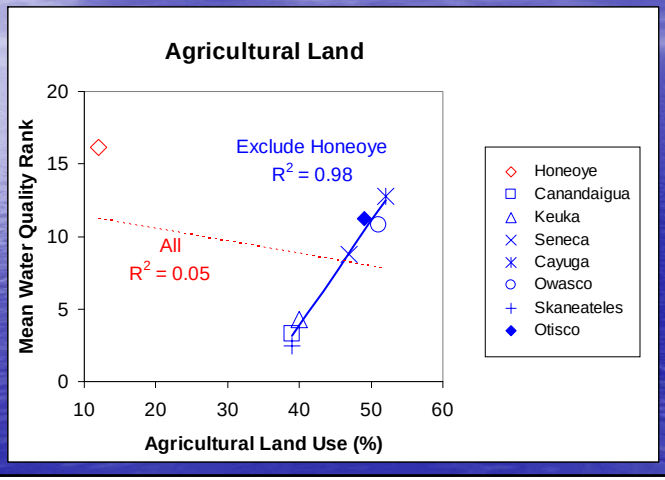


Annual Water Quality Rank

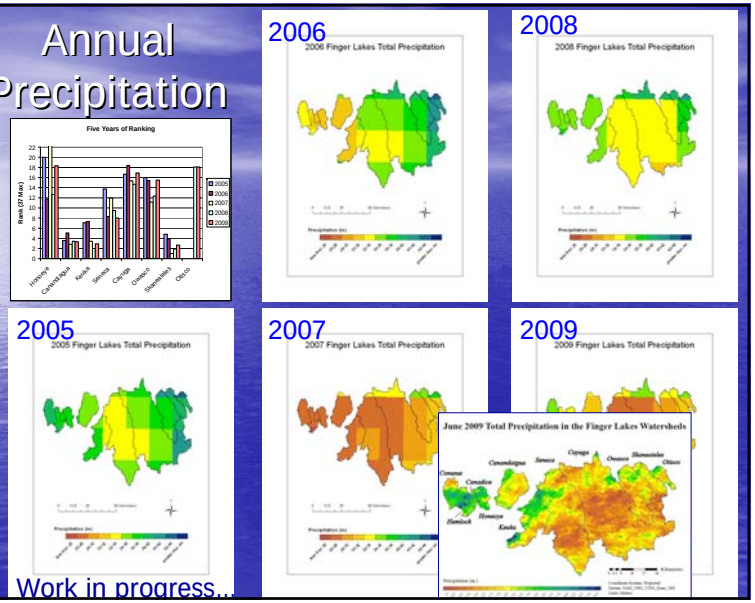
Owasco Rank got WORSE in 2009



Runoff Agricultural Landscape



Annual Precipitation



Other Possibilities Top-Down Approach

Plankton
Dissolved Nutrients
Bacterial Decomposition
Fish (Lake Trout) & Other Organisms
Dead Organics

Zebra & Quagga Mussels
Decrease Algae (Clear)

Spiny Water Flea
Increase Algae (Bloom)

Cercopagis pengoi
Carnivorous Zooplankton

Zebra & Quagga Mussels Impact on Algae

Plankton
Dissolved Nutrients
Bacterial Decomposition
Zebra & Quaggas
Fish (Lake Trout) & Other Organisms
Dead Organics

Pre-Zebras
Post Zebras
Death 1st Wave

Chlorophyll & Nutrient Data

Cercopagis (spiny hook water flea) Impact on Algae

Algae (phytoplankton)
Plankton
Dissolved Nutrients
Zooplankton
Bacterial Decomposition
Cercopagis
Fish (Lake Trout) & Other Organisms
Dead Organics

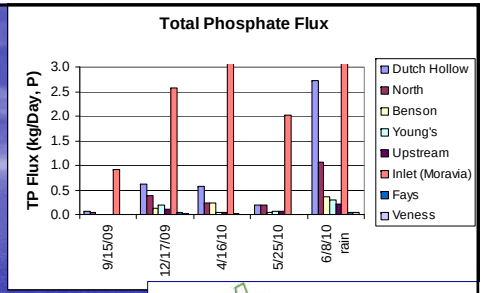
Pre-*Cercopagis*
Post *Cercopagis*

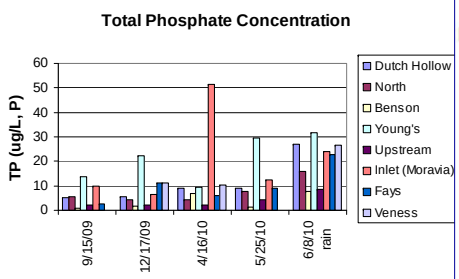
Chlorophyll & Nutrient Data

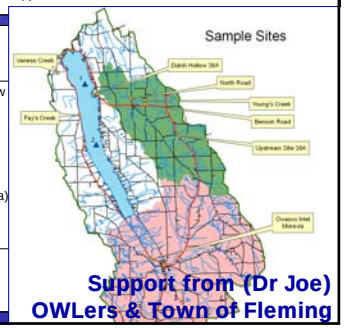
Recent '09 & '10 Stream Data

Rain → Runoff & Impact All Land Use → Young's Creek

Flux → Largest Watersheds





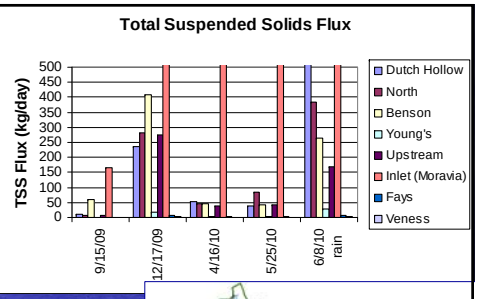


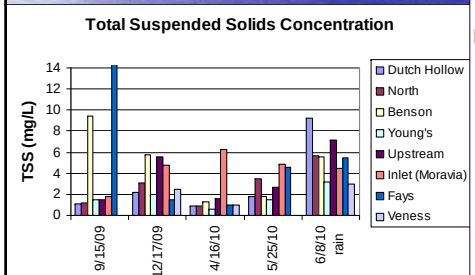
Support from (Dr Joe) OWLers & Town of Fleming

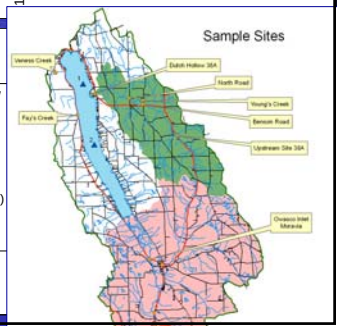
More '09-10 Stream Data

Rain ➔ Runoff & Impact All Land Use ➔ Young's Creek

Flux ➔ Largest Watersheds

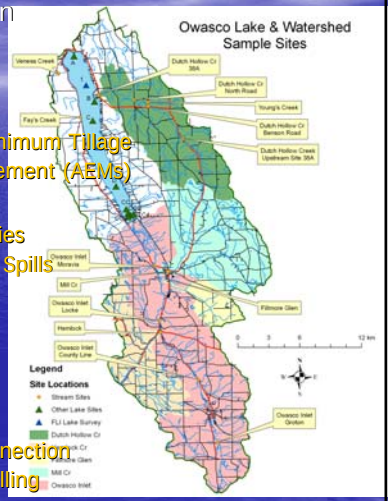






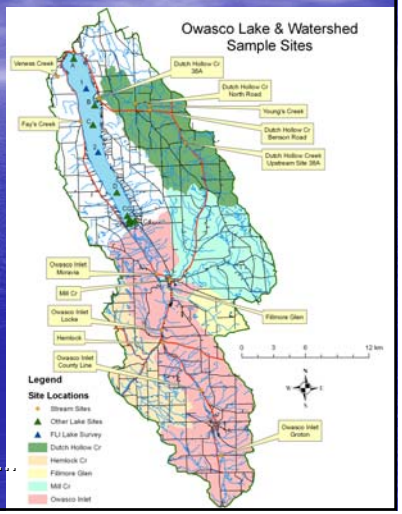
Owasco Recommendations

- Watershed Protection Legislation
- Owasco Inlet Floodplain
  - Remove Channelization
- Agricultural BMPs
  - Contour Plowing, Buffer Strips, Minimum Tillage
  - Agricultural Environmental Management (AEMs)
- Watershed Inspector
  - Inspects Onsite & Municipal Facilities
  - CAFO Manure Storage, Disposal & Spills
  - Information about BMPs
- Education, esp. K-12
  - Educate People so they Care!
- Monitoring
  - Water Quality Status
  - Land Use and Nutrient Runoff Connection
  - New Threats – Marcellus Shale Drilling

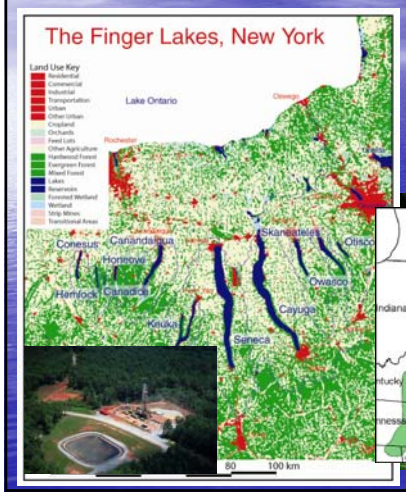


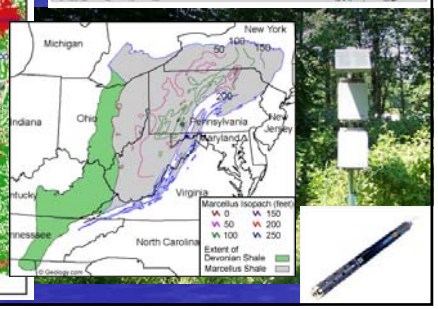
Future Monitoring: 2010 & Beyond

- 2011 & 2012?
  - Lake Research
    - Lakes Sites 1, 2, A-E
      - Focused ➔ Summer Months
  - Stream Research
    - Streams
      - Owasco Inlet Site(s)
      - Dutch Hollow Site(s)
      - Others?
    - Event (Rain) vs. Base Flow
    - Seasonal Differences
- If Funding Available!
  - Significant Effort by Dr. Joe…

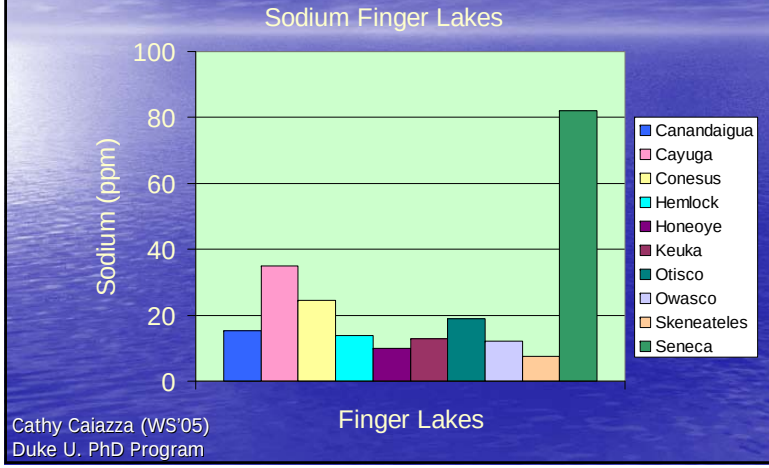


Marcellus Shale?



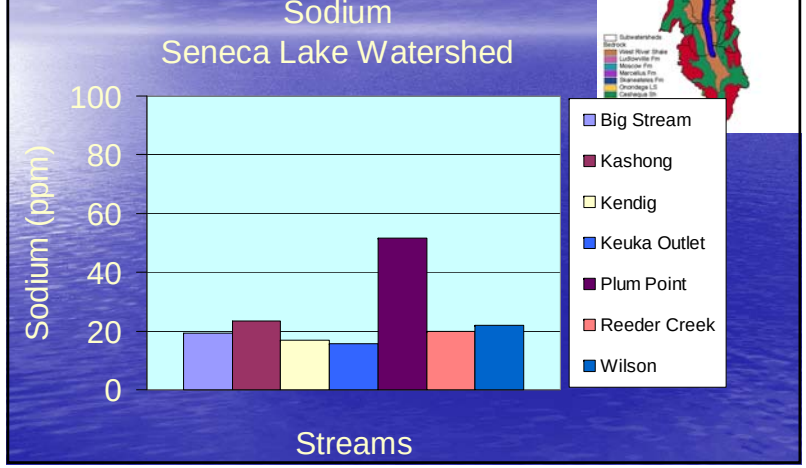


Chloride & Sodium Mystery



Cathy Caiazza (WS'05)
Duke U. PhD Program

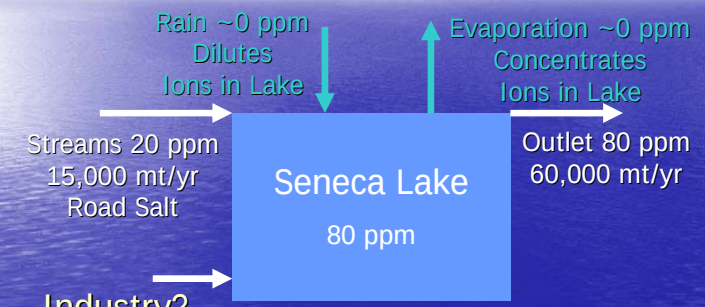
Sodium Input (Streams)



Another Source?
Salt Mining Activities

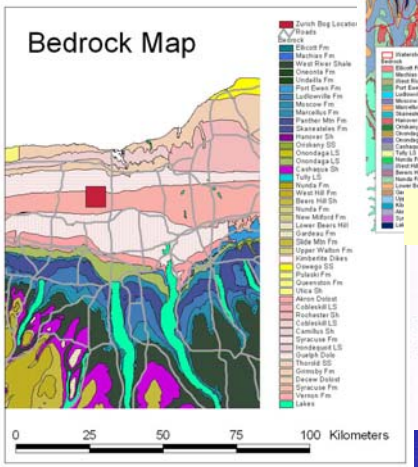
- Salt Mines
  - Central New York Importance
  - Dump 2,300 metric tonnes Sodium / day into Seneca Lake
- Impact on Lake Salt Concentration
  - Road Salt
  - Increase Concentration Most Lakes to 25 ppm
  - Seneca Lake at 80 ppm

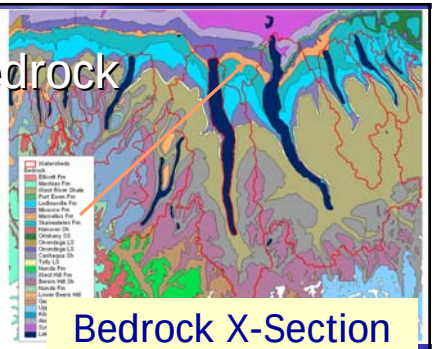
Source: Chloride & Sodium Ions
Geochemical Approach



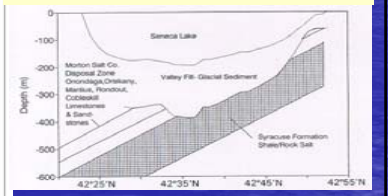
Industry?
Groundwater / Rock Salt Bedrock?
40 to 45,000 mt/yr

Finger Lake Bedrock



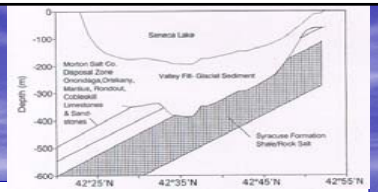


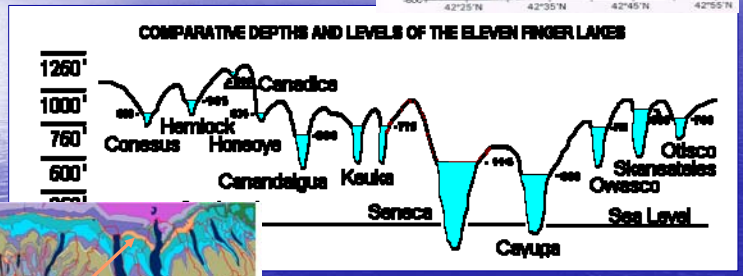
Bedrock X-Section

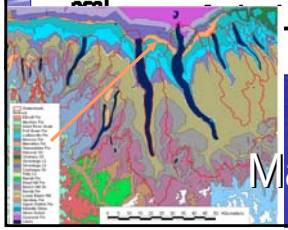


South North

Basin Depths







Marcellus Shale Threats?

2010 Research Team

Questions?

John Halfman, HWS
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