

Water Resources of NYS: Surface Water

Prof. Anthony Grande
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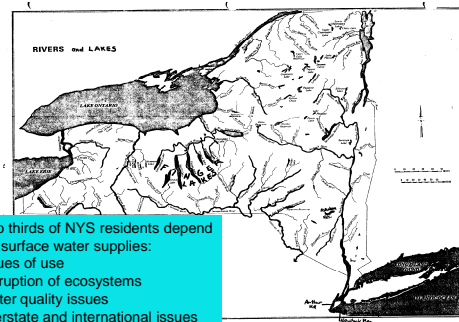
MIDTERM EXAM

- Thursday, October 25
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- Extra credit exercises for first half of semester are due Oct. 30 (new date).

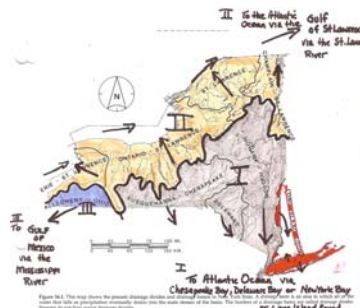
Surface Waters



Surface Waters



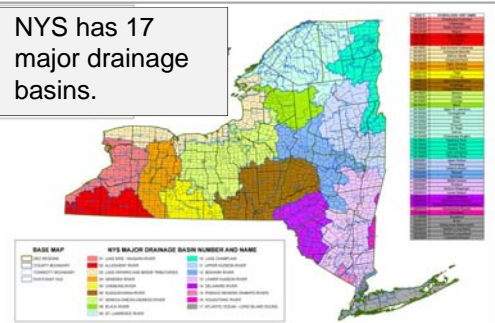
Continental Drainage Basins

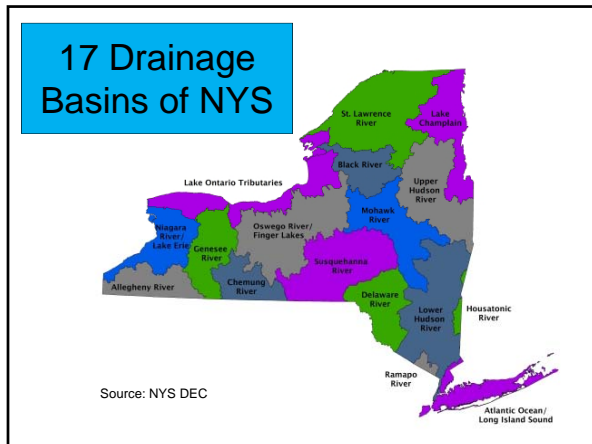


I -- to Atlantic Ocean via Hudson, Delaware and Susquehanna rivers.
II -- to Atlantic Ocean via Great Lakes-St. Lawrence River basin to the Gulf of St. Lawrence.
III -- to Atlantic Ocean via the Ohio-Mississippi river basin to the Gulf of Mexico

Drainage Basins

NYS has 17 major drainage basins.





Watershed

- A **watershed** is the area of land (a drainage basin) where all water flows to the same place.
- A **watershed divide** separates drainage basins.
- The EPA identifies **57 NYS watersheds**

http://cpub.epa.gov/surf/locate/huc/erstate_search.cfm?statepostal=NYS

Watershed Diagram

Source: US EPA

Geography of Waters

- <http://www.epa.gov/waters/about/geography.html>

Source: US EPA

EPA Watershed Codes

Surf Your Watershed

State Search Results

List of Huc Codes Produced by Search

(search for: NY)

- 02010004 Ausable; state(s): NY, VT
- 04130102 Black; state(s): NY
- 03030102 Benes; state(s): CT, NY
- 04120103 Buffalo-Eighteenmile; state(s): NY
- 04120104 Cattaraugus; state(s): NY
- 04120102 Chaumont-Perch; state(s): NY
- 04120103 Chautauque-Connetquot; state(s): NY, OH, PA
- 02020102 Chemung; state(s): NY, PA
- 02020103 Chenango; state(s): NY
- 02010002 Conewango; state(s): NY, PA
- 02040101 East Branch Delaware; state(s): NY, PA
- 04120301 English-Salmon; state(s): NY
- 02010004 French; state(s): NY, PA
- 04120304 Grass; state(s): NY
- 02010008 Great Chazy-Saranac; state(s): NY, VT
- 04030103 Hackensack-Passaic; state(s): NJ, NY
- 01100004 Housatonic; state(s): CT, MA, NY
- 02020004 Hudson-Hopewick; state(s): MA, NY, VT
- 02020008 Hudson-Wappinger; state(s): NY
- 04120304 Indiana; state(s): NY
- 04140101 Irondequoit-Ninemile; state(s): NY
- 04120204 Lake Erie; state(s): MI, NY, OH, PA
- 02010004 Lake George; state(s): NY, VT
- 04120204 Lake Ontario; state(s): NY
- 02010004 Lamoille; state(s): NY, VT
- 01100002 Long Island Sound; state(s): CT, NY, RI
- 04130003 Lower Genesee; state(s): NY
- 02030101 Lower Hudson; state(s): CT, NJ, NY
- 02040104 Middle Delaware-Moogoon-Brookhead; state(s): NY
- 02020006 Middle Hudson; state(s): MA, NY
- 02020004 Mohawk; state(s): NY
- 04120104 Niagara; state(s): NY
- 02020001 Northern Long Island; state(s): NY
- 04120001 Oak Orchard-Taevemnie; state(s): NY
- 04140102 Oneida; state(s): NY
- 04120302 Oswego-Gatchusa; state(s): NY
- 04140103 Oswego; state(s): NY
- 02010002 Otter; state(s): NY, VT
- 02020103 Oswego-Wappinger; state(s): NY, PA
- 04130303 Raquette; state(s): NY
- 02020102 Rondout; state(s): NJ, NY
- 02020002 Sacandaga; state(s): NY
- 04140102 Saratoga-Sandy; state(s): NY
- 02020002 Schoharie; state(s): NY
- 02030104 Sandy Hook-Staten Island; state(s): NJ, NY
- 01100006 Saugerties; state(s): CT, NY
- 02020002 Schoharie; state(s): NY
- 04140201 Seneca; state(s): NY
- 02020002 Southern Long Island; state(s): NY
- 04130306 St. Regis; state(s): NY
- 02020104 Tioga; state(s): NY, PA
- 02010001 Upper Allegheny; state(s): NY, PA
- 02040101 Upper Delaware; state(s): NY, PA
- 04130002 Upper Genesee; state(s): NY, PA
- 02020002 Upper Hudson; state(s): NY
- 04130302 Upper St. Lawrence; state(s): NY, PA
- 02020101 Upper Susquehanna; state(s): NY, PA
- 02010003 Winouski; state(s): NY, VT

NYC Water Supply System

NYC's water supply is a **watershed-based system using gravity flow methodology** (with some pumping) that moves water 125 miles from the Catskills to NYC. It provides water for communities along the path of its aqueducts.

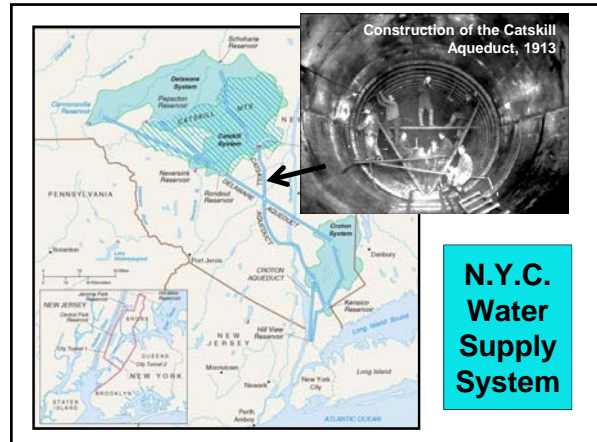
http://www.nyc.gov/html/dep/html/watershed_protection/reservoirs.shtml

NYC Water Distribution System

- 1830s - Water shortages in Manhattan were common.
- 1840s - CROTON SYSTEM built in Westchester Co.
- 1850s-1880s - Croton System was expanded (NEW CROTON SYSTEM).
- 1880-90s - Croton System could not keep up with demand.
- 1907-1927 - CATSKILL SYSTEM was built on the east side of the Catskills.

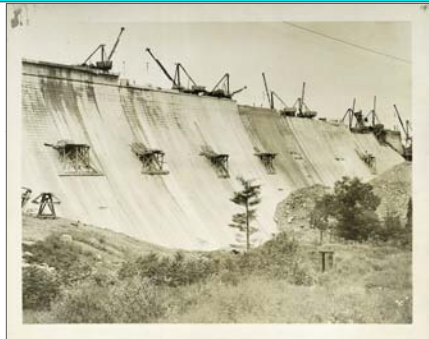
NYC Water Distribution System

- 1907-1927 – CATSKILL SYSTEM
- The ASHOKAN RESERVOIR was built in river valleys west of Kingston.
- The CATSKILL AQUEDUCT carried water by gravity to the Kensico Reservoir of the Old Croton System.
- A tunnel crossed the Hudson.
- The SCHOHARIE RESERVOIR was built to supplement water storage.
- Before the Catskill System was finished, it became strained by increasing demand for water.



N.Y.C. Water Supply System

Ashokan Reservoir Dam under construction



Ashokan Reservoir, The Catskills

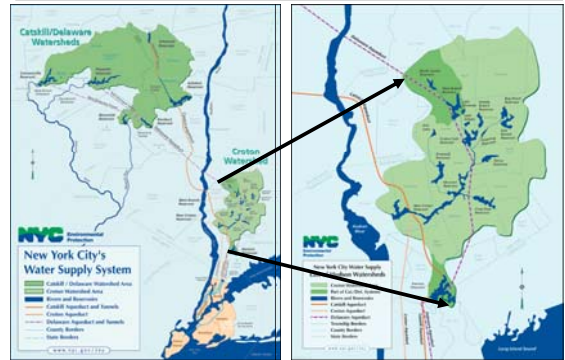


NYC Water Distribution System

- The NYS Legislature authorized NYC to tap the headwaters of the DELAWARE RIVER on the west side of the Catskills.
- Starting in the 1920s the DELAWARE SYSTEM was constructed.
- Three reservoirs were built - RONDOUT, NEVERSINK and PEPACTION.
- TUNNELS were required to move water across the watershed divides to the Rondout. The DELAWARE AQUEDUCT carries water across the Hudson to the Croton Watershed.
- The CANNONVILLE RESERVOIR, the last of the system, was put into service in the mid-1960s.



NYC Water Supply System



http://www.nyc.gov/html/dcp/html/watershed_protection/reservoirs.shtml

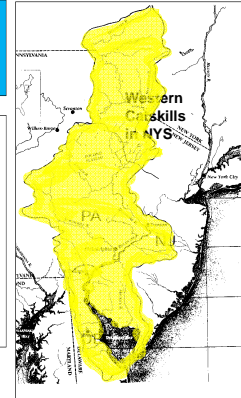
NYC Water Distribution System

- NYC's water supply is a watershed-based system using gravity flow methodology, with some pumping, to move water 125 mi. from the Catskills to NYC.
- The Catskill-Delaware System provides 90% of the water.
- The Croton System provides 10%.
- There are 19 reservoirs and 3 controlled lakes in NYC system.
- Water is moved via gravity through a series of aqueducts to terminal reservoirs (Kenisco) in Westchester County.
- Water goes through a purification process before entering the tunnels of the distribution system.

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Delaware River Watershed

- Headstreams of the Delaware rise in the Catskills.
- NYC dams the headstreams for its water supply.
- PA, NJ and DEL have sued NYS to release greater amounts of water from the NYC reservoirs.



PROBLEMS facing the NYC Water Supply System

Water volume problems exist.

- **Supply** – cities and towns along the right-of-way tap into the system.
- **PA, NJ and DE have sued NYS and won** to get a guaranteed flow of water down the Delaware River.
- **Dependent on rain and snow melt.** In times of drought, the reservoirs dry up.

Water quality problems exist.

- **Salt** in the water from winter road salting
- **Seepage** from septic tanks, gasoline tanks, etc.
- **Run off** from farms and landfills
- **Airborne pollutants**
- **Quality of pipes**
- **Threat from terrorism**

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NYC Drinking Water Report

- NYC and NYS monitor the city's water supply.
- A **Drinking Water Supply and Quality Report** is issued every year. See it at <http://www.nyc.gov/html/de/pdf/wsstate11.pdf>



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