



# Evolving Watershed Management

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Carter H. Strickland, Jr

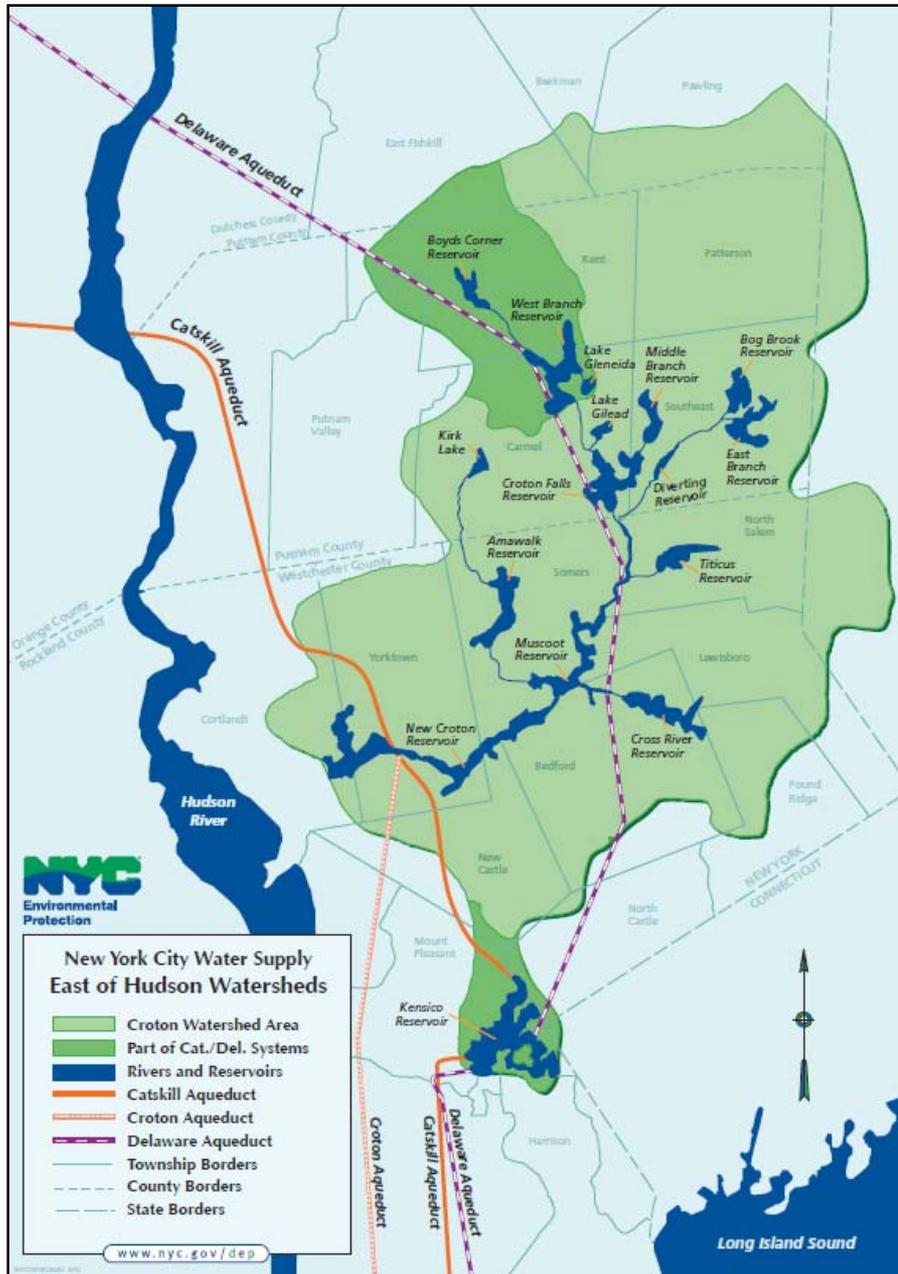
Commissioner, New York City  
Department of Environmental Protection

# Brief History of NYC's Water Supply System



## 1677 to 1835

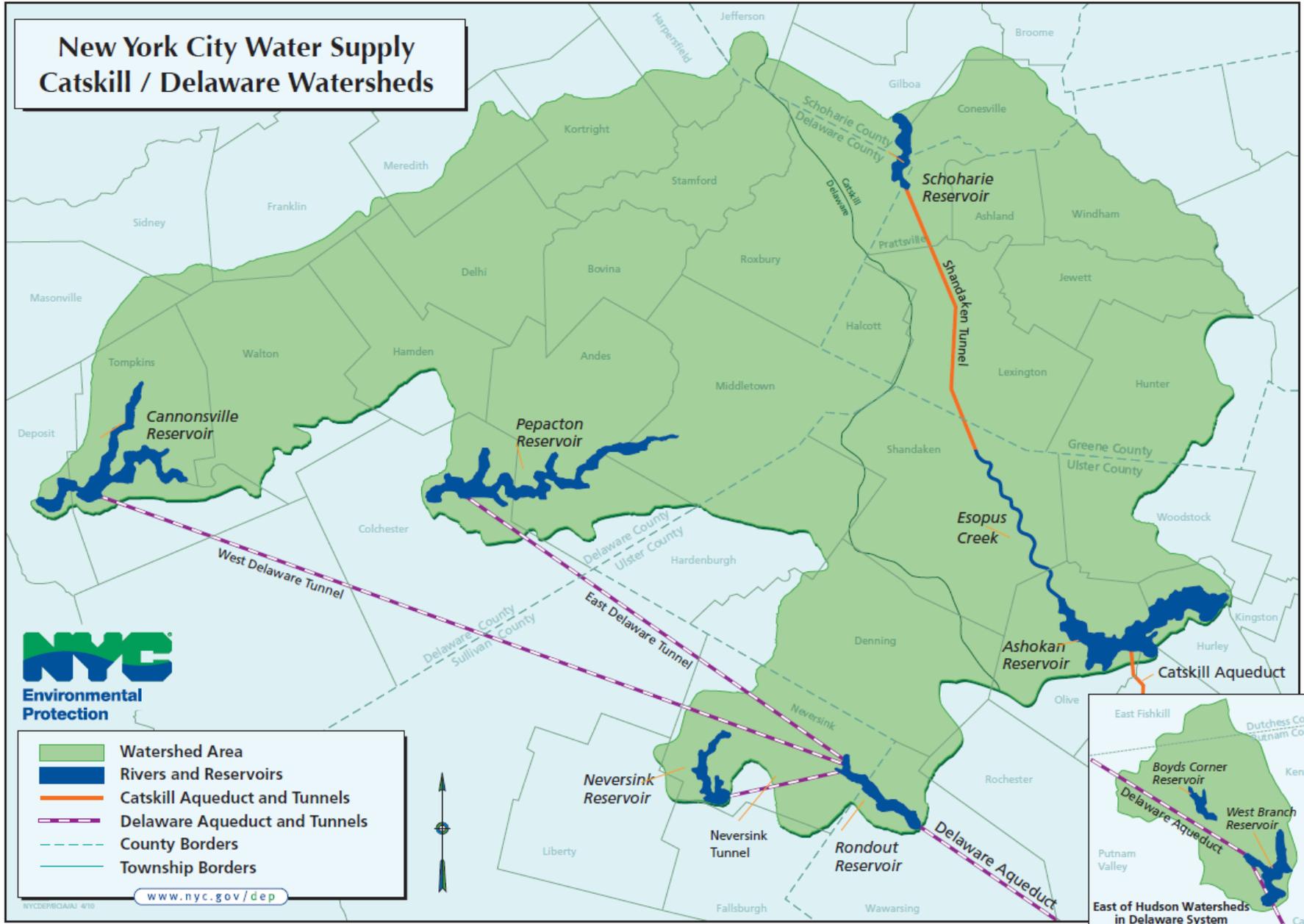
- 1677: First public well was dug near an old fort at Bowling Green
- 1776: Population reaches 22,000 and a reservoir was constructed in downtown Manhattan
- 1800: Manhattan Company sinks a well and pumps water into reservoir
- Population continues to grow; well water starts to become polluted and supply becomes insufficient
- 1835: City decides to impound water from the Croton River in Westchester County



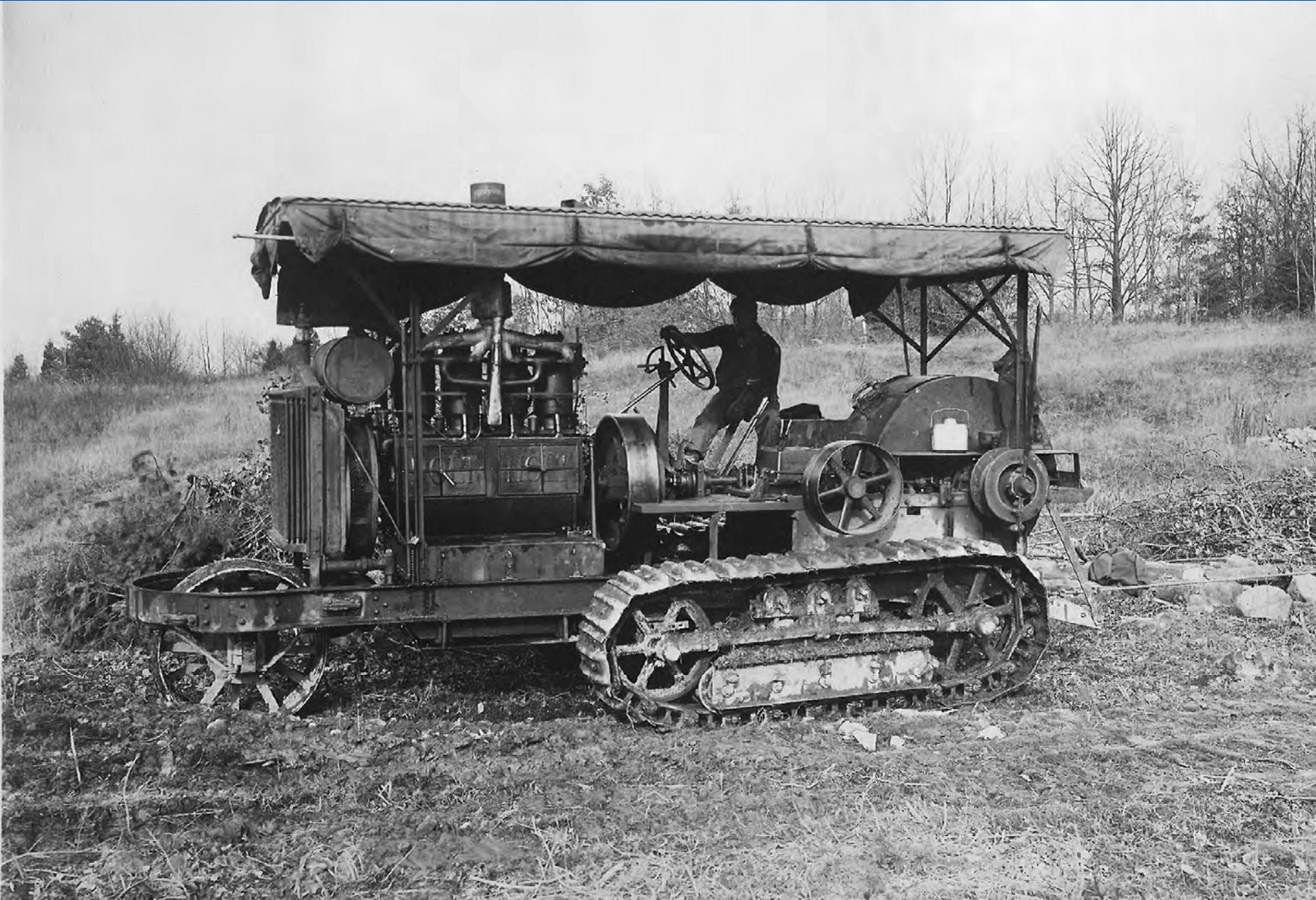
## 1835 to 1911

- 1837: Construction underway on the Old Croton Reservoir, 42<sup>nd</sup> Street Reservoir, and connecting tunnels
- 1842: Croton water first reaches NYC
- 1869: Water demand rises to 77 MGD
- 1870: City acquires three controlled lakes in Putnam County
- 1891: Construction begins on New Croton Dam to meet 183 MGD demand
- 1909: Construction begins on two balancing reservoirs, Kensico and Hillview

# West of Hudson (1907-1965)



# Grubbing Machine – Ashokan Reservoir



# Grubbed & Cleared Trees - Ashokan Reservoir



ACC HDQR 518 CONT 72. 12. 11. 13.

# Unsanitary Conditions – Esopus Watershed



# Poorly Buried Dead Horse – Esopus Watershed



**HOOVES**

RES 1313

# Old Outhouse – Esopus Watershed



# New Outhouse – Esopus Watershed



RES 1170



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- Since 1997, City has acquired more than 122,000 acres for source water protection
  - The City only acquires land from willing sellers and pays fair market value
  - DEP uses scientific criteria to determine which lands to target for land acquisition

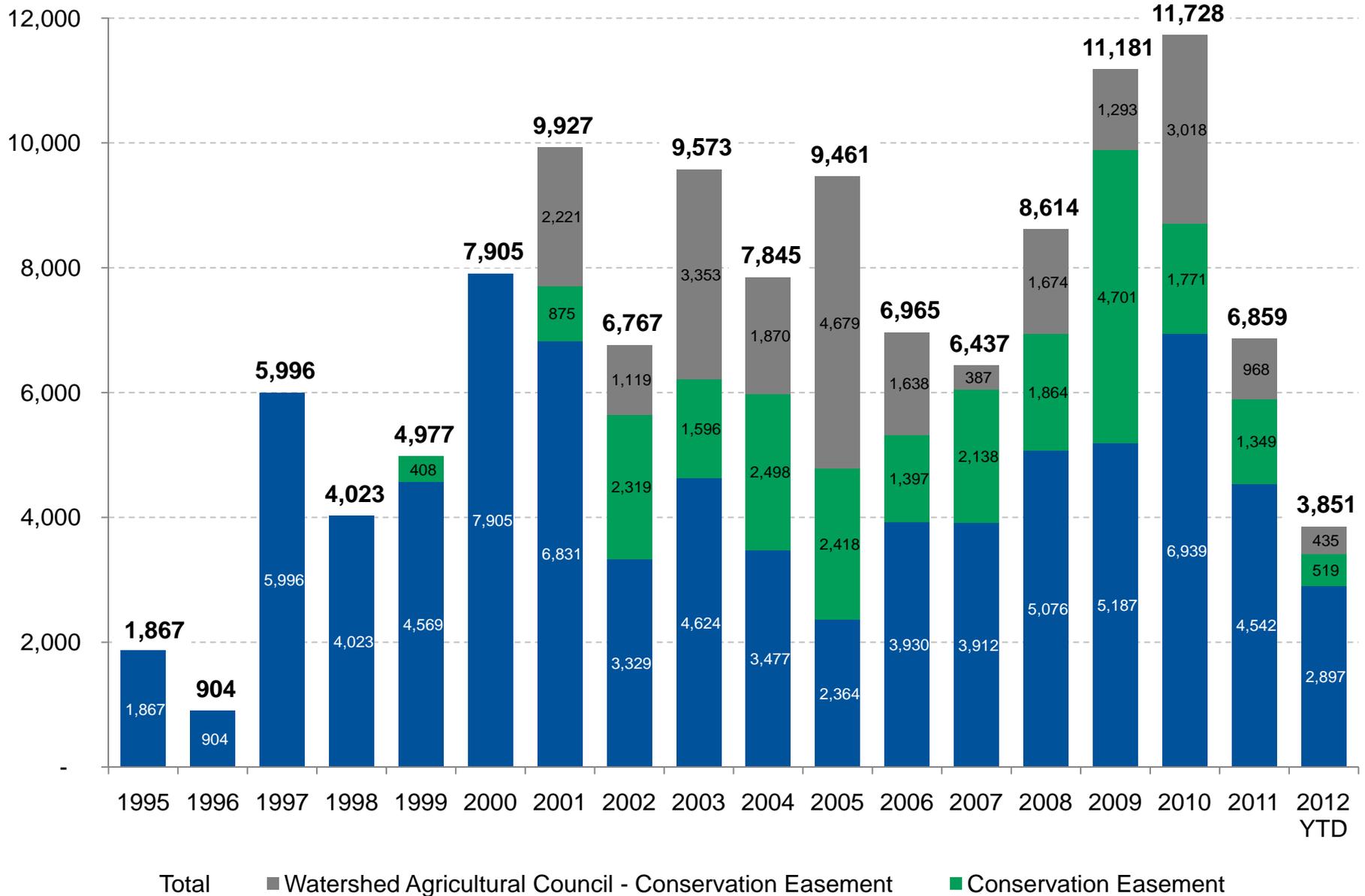
235 acres in Andes, acquired in 2002



279 acres in Roxbury, acquired in 2004

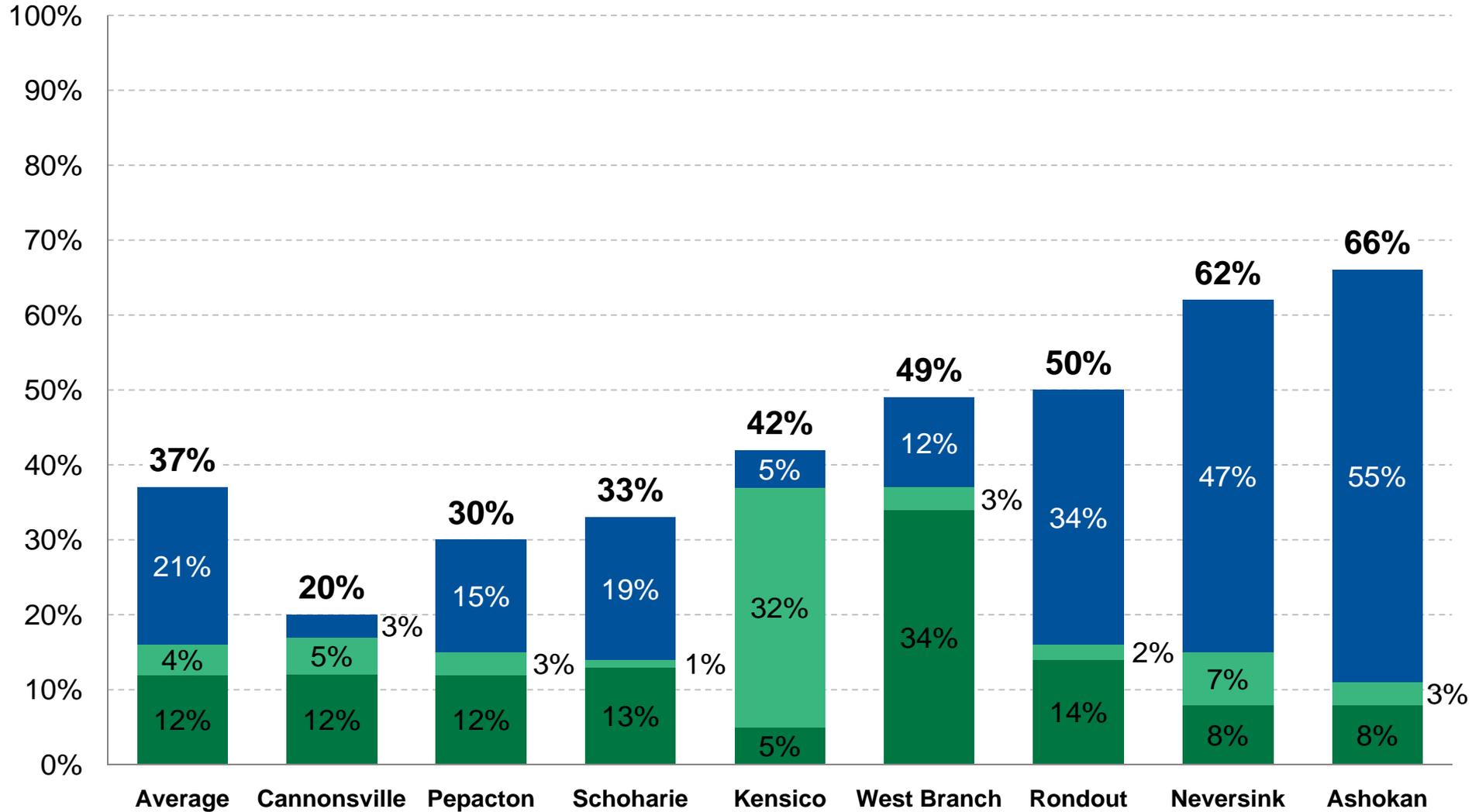


# Land Acquisition Program: Land Area Contracts by Year

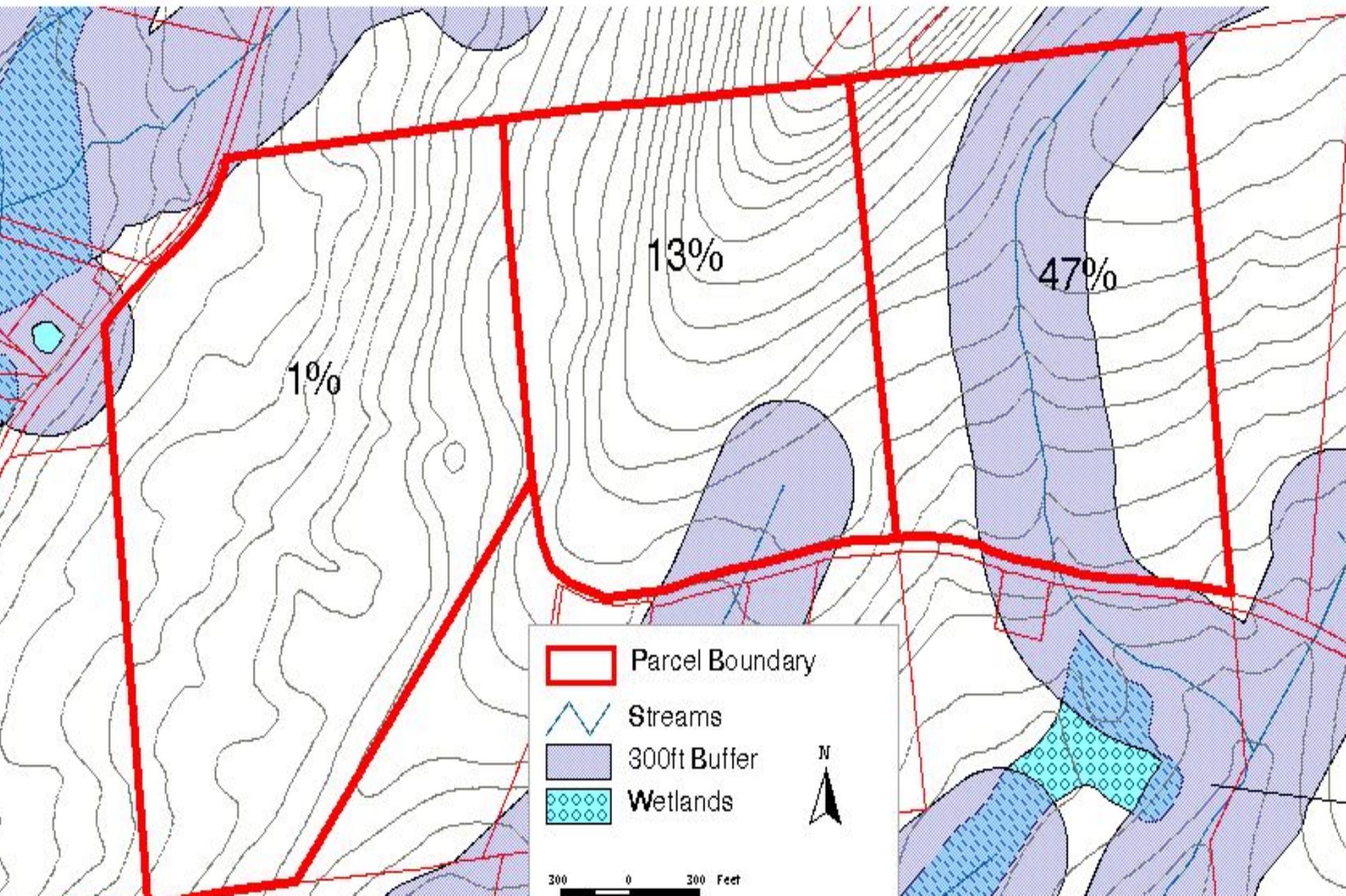


# Protected Lands by Basin; % of Basin Land Area

Total ■ Non-City ■ Pre-MOA



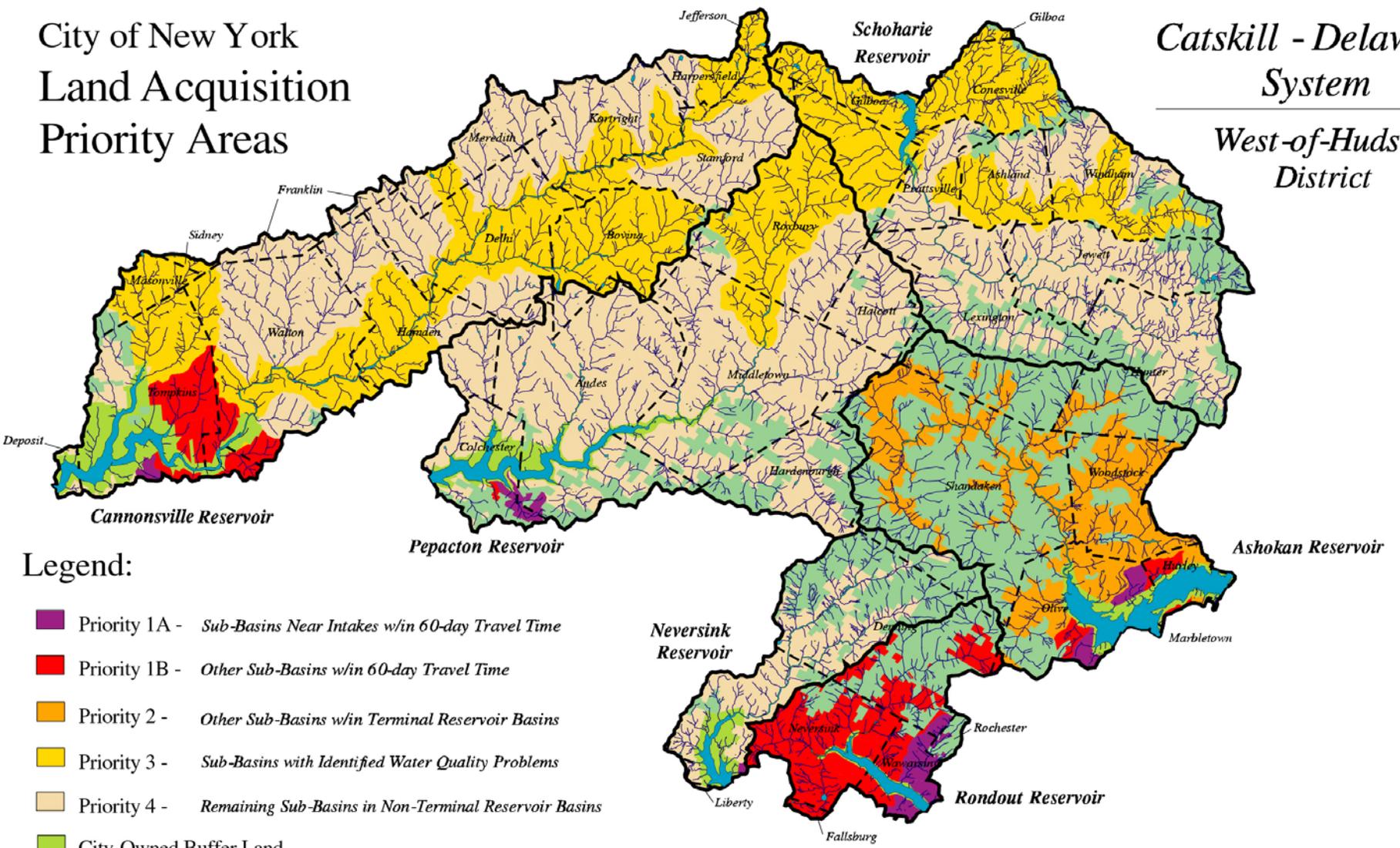
# Surface Water Criteria - Examples



# Land Acquisition Priority Areas: Delaware & Catskill

## City of New York Land Acquisition Priority Areas

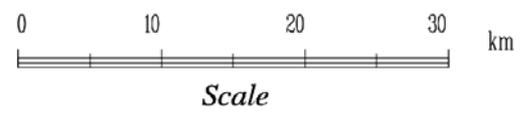
*Catskill - Delaware  
System*  
*West-of-Hudson  
District*



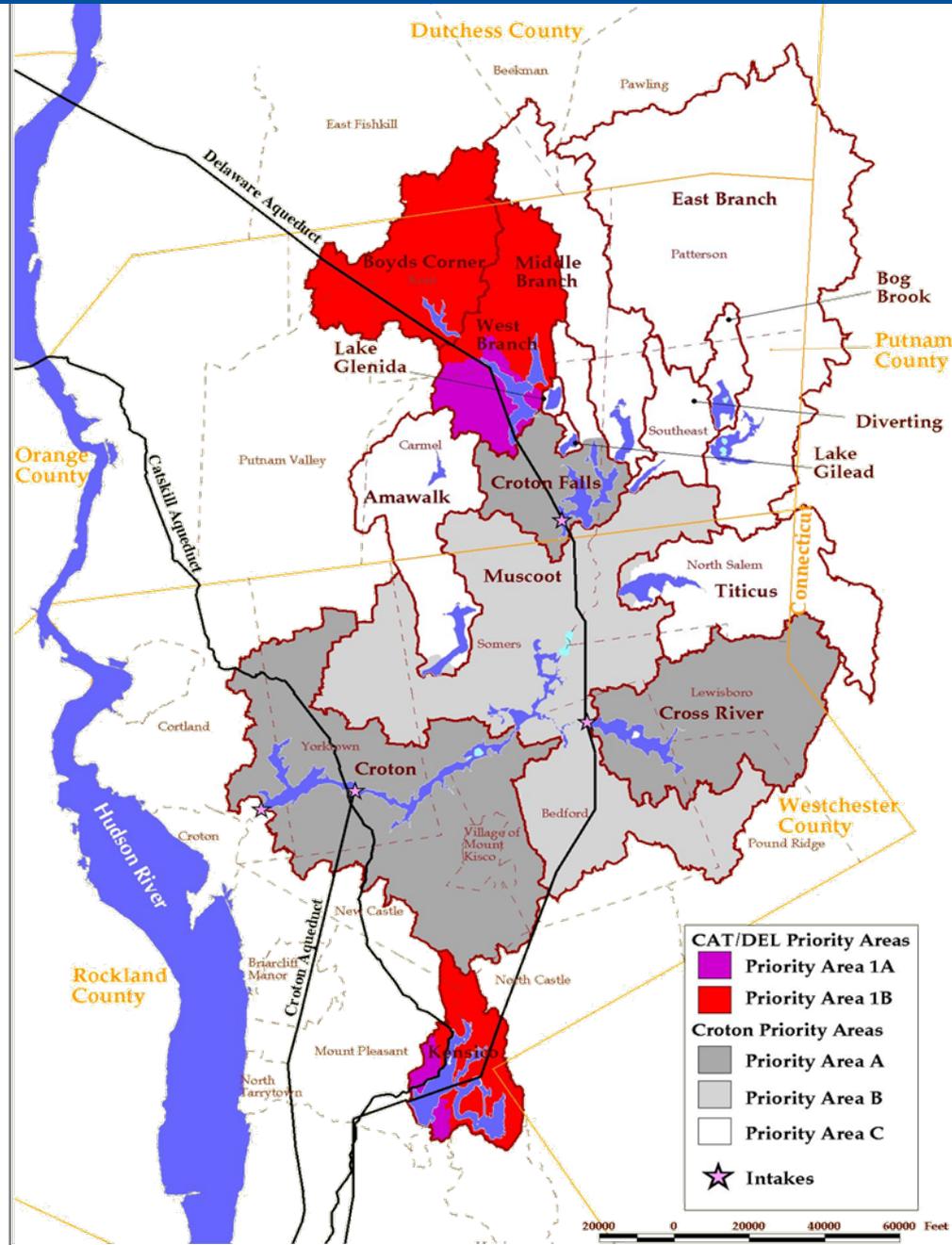
### Legend:

- Priority 1A - Sub-Basins Near Intakes w/in 60-day Travel Time
- Priority 1B - Other Sub-Basins w/in 60-day Travel Time
- Priority 2 - Other Sub-Basins w/in Terminal Reservoir Basins
- Priority 3 - Sub-Basins with Identified Water Quality Problems
- Priority 4 - Remaining Sub-Basins in Non-Terminal Reservoir Basins

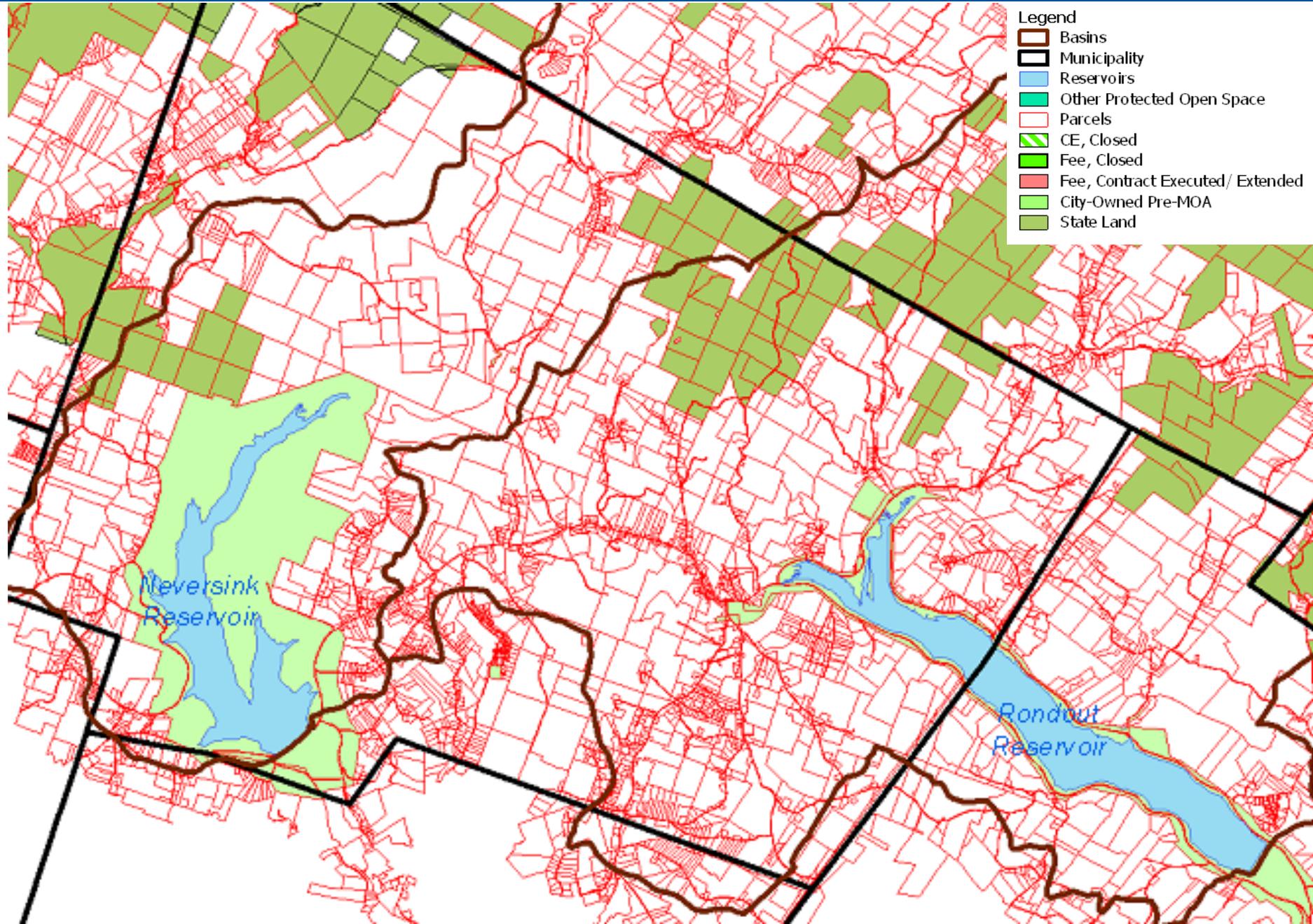
- City-Owned Buffer Land
- State-Owned Land
- Basin Boundary
- Town Boundary



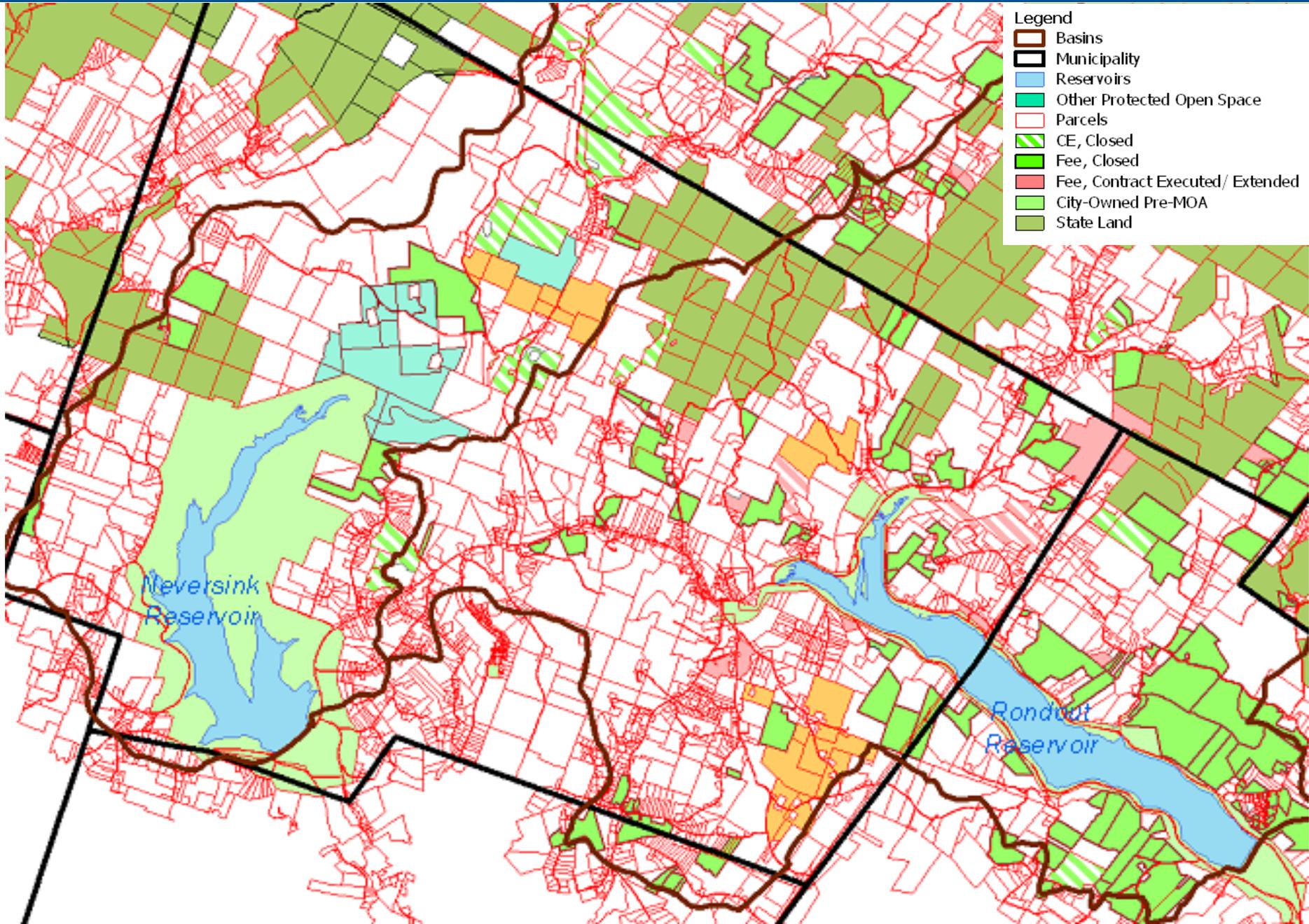
# Land Acquisition Priority Areas: East of Hudson



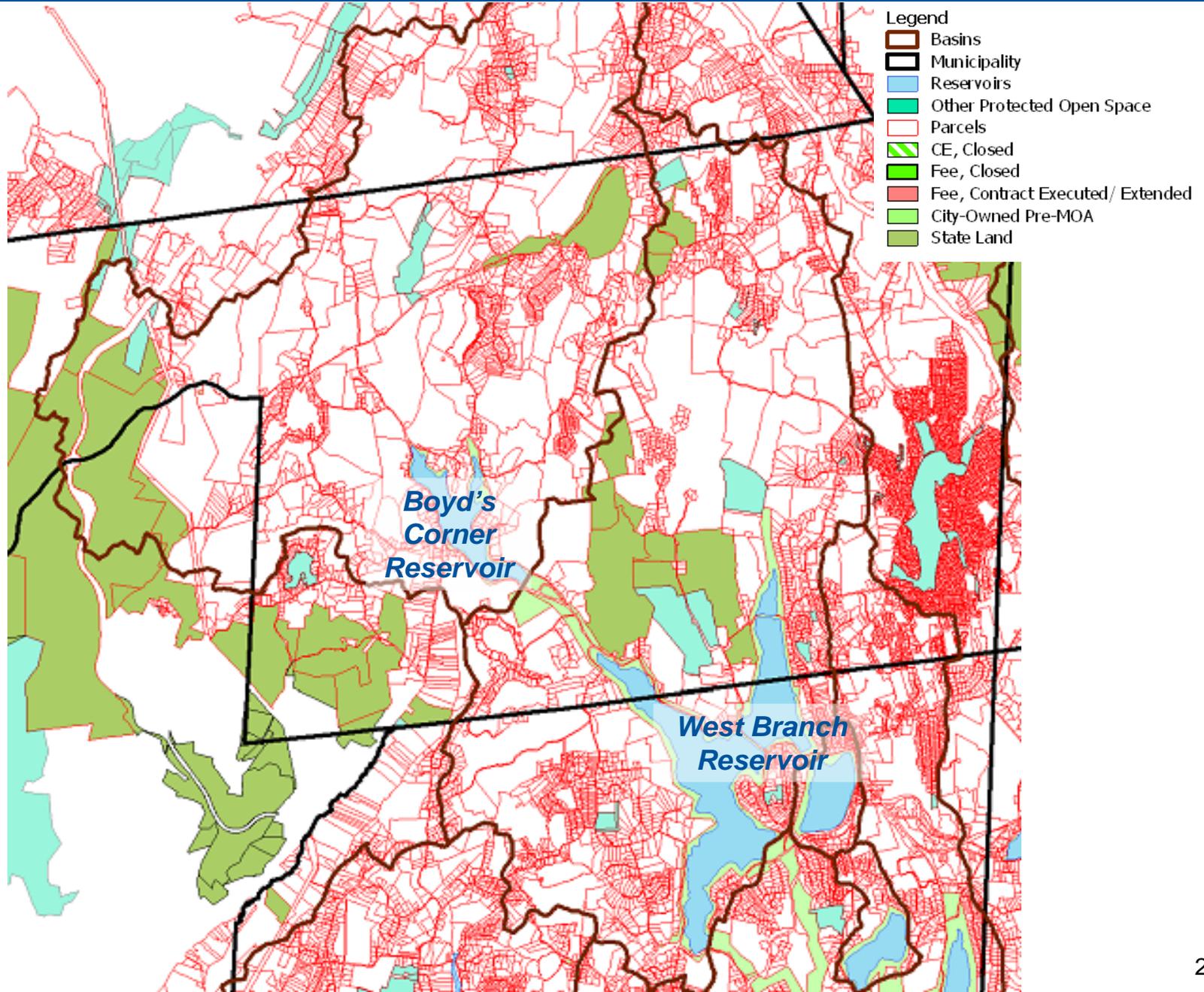
# Neversink & Rondout Basins: 1997



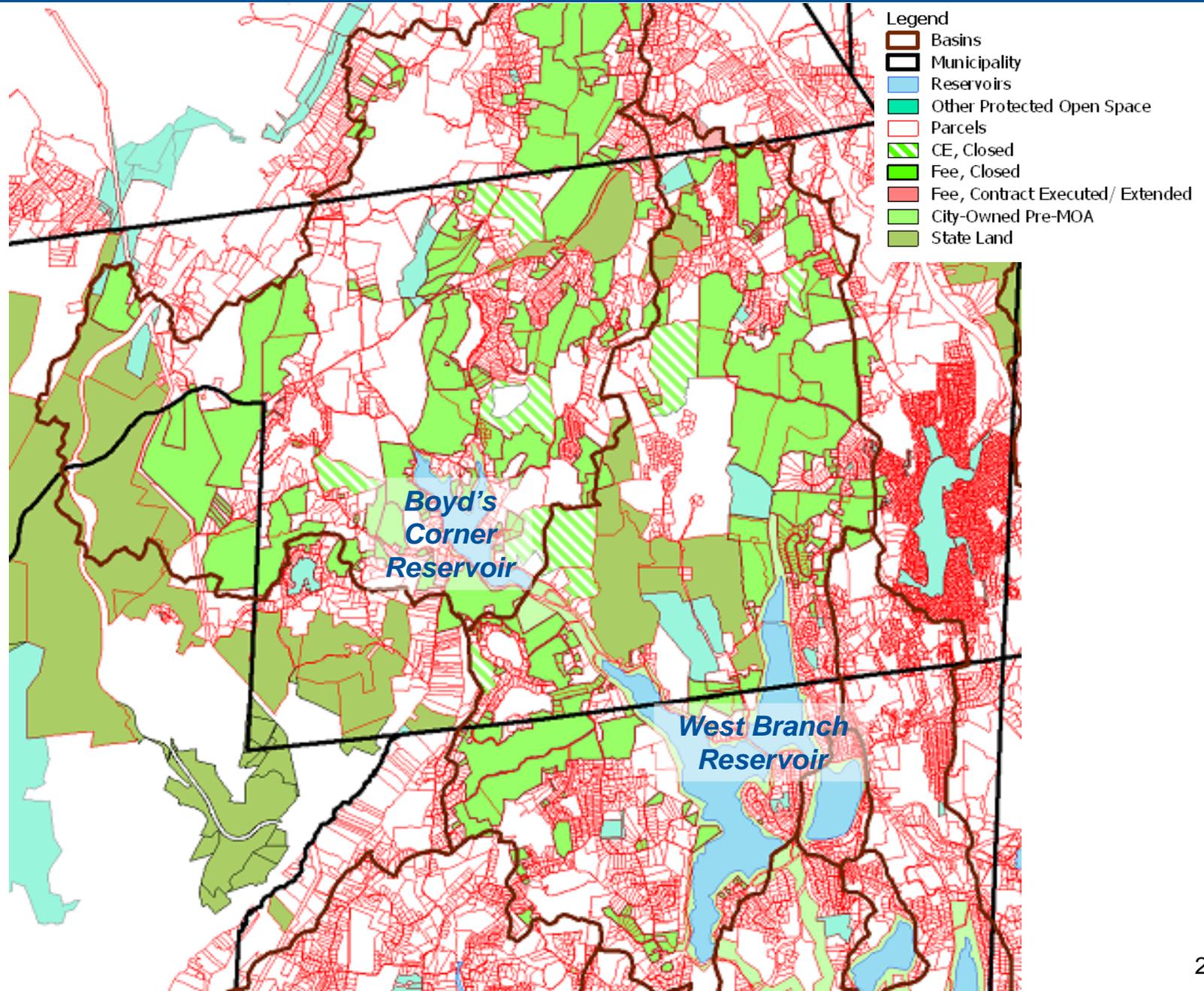
# Neversink & Rondout Basins: 2012



# Boyd's Corner: Protected Land as of 1997



# Boyd's Corner: Protected Land as of 2012



# Farm and Forest Management Plans

## Cannonsville Basin

### Watershed Agricultural Program - Working Lands

As of January 2012

#### LEGEND:

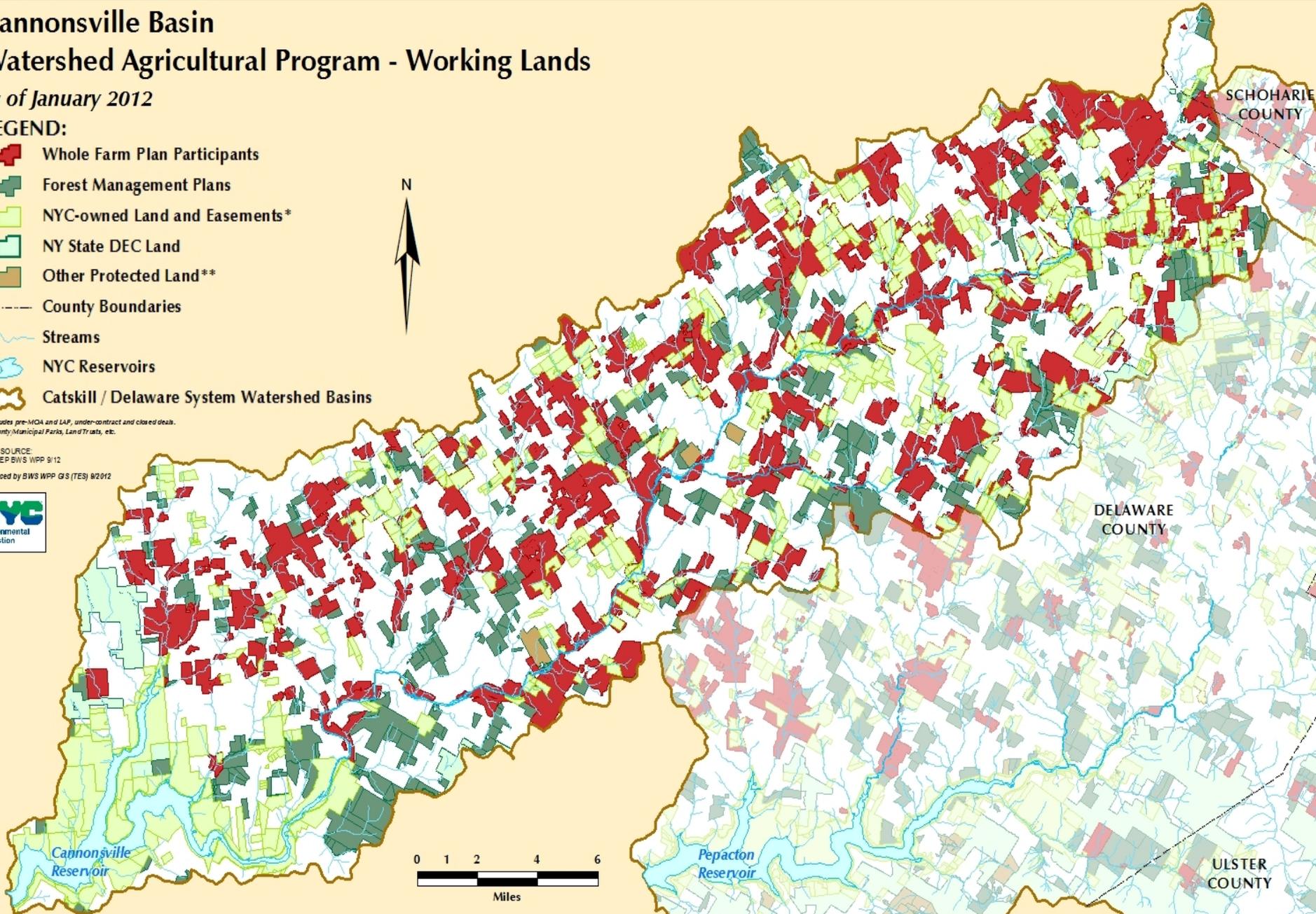
-  Whole Farm Plan Participants
-  Forest Management Plans
-  NYC-owned Land and Easements\*
-  NY State DEC Land
-  Other Protected Land\*\*
-  County Boundaries
-  Streams
-  NYC Reservoirs
-  Catskill / Delaware System Watershed Basins

\* Includes pre-MGA and LAF, under-contract and closed deals.

\*\* County/Municipal Parks, Land Tracts, etc.

DATA SOURCE:  
NYC DEP BWS WPP 9/12

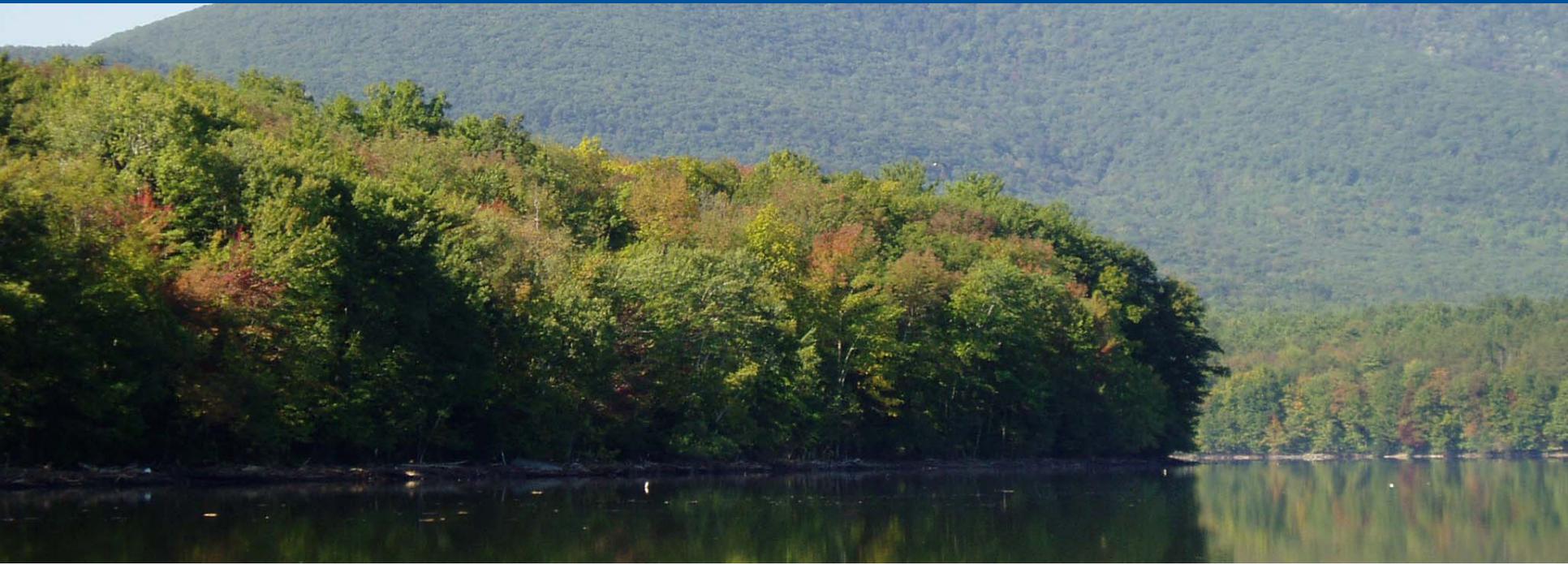
Produced by BWS WPP GIS (TES) 8/2012





Through December 2011, DEP has:

- Completed 407 Whole Farm Plans completed in total, including 250 large farms, 95 small farms, and 62 East-of-Hudson farms
- Installed 6,434 total best management practices at a cost of \$42.7 million, including 5,087 on large farms at cost of \$35.7 million, 952 on small farms at cost of \$3.7 million, and 393 on East-of-Hudson farms at cost of \$3.3 million



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Through December 2011, DEP has:

- Completed 996 Forest Management Plans completed, covering in total 182,713 watershed acres
- Completed 311 Forest Road best management projects
- Finished 100+ portable bridge projects
- Held 250+ professional training workshops for loggers and foresters

	<b>Baseline 1971–2000</b>	<b>2020s</b>	<b>2050s</b>	<b>2080s</b>
<b>Air Temperature</b>	<b>55°F</b>	<b>+ 1.5 to 3°F</b>	<b>+ 3 to 5°F</b>	<b>+ 4 to 7.5°F</b>
<b>Precipitation</b>	<b>46.5 in</b>	<b>+ 0 to 5%</b>	<b>+ 0 to 10%</b>	<b>+ 5 to 10%</b>
<b>Sea Level Rise</b>	<b>NA</b>	<b>+ 2 to 5 in</b>	<b>+ 7 to 12 in</b>	<b>+ 12 to 23 in</b>
<b>Rapid Ice-Melt Sea Level Rise</b>	<b>NA</b>	<b>+ 5 to 10 in</b>	<b>+ 19 to 29 in</b>	<b>+ 41 to 55 in</b>



**Before**



**After**

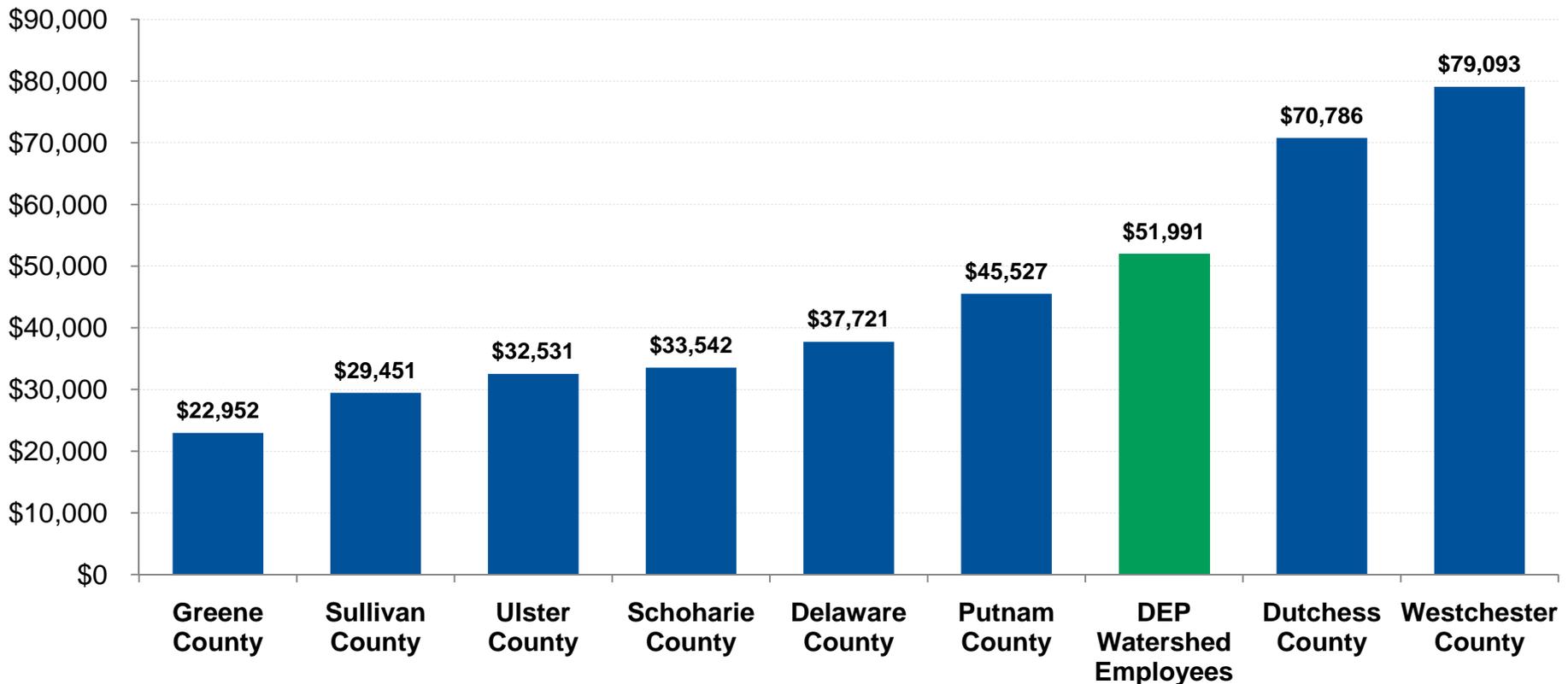
## Stream Management Program

- Stabilizes failing stream beds and banks to prevent erosion
- Series of Management Plans and Demonstration Projects underway
  - 50 restoration projects complete
  - 5 Stream Management Plans complete
- Promotes sound stream protection practices with local partners; community participation key to program success

# DEP Employment in the Watershed

- More than 850 DEP employees work in the watershed, with an average salary of \$51,991.
- In 2009, DEP paid more than \$44 million in salaries to employees working within the eight watershed counties.

### Average Annual Wages (2009)

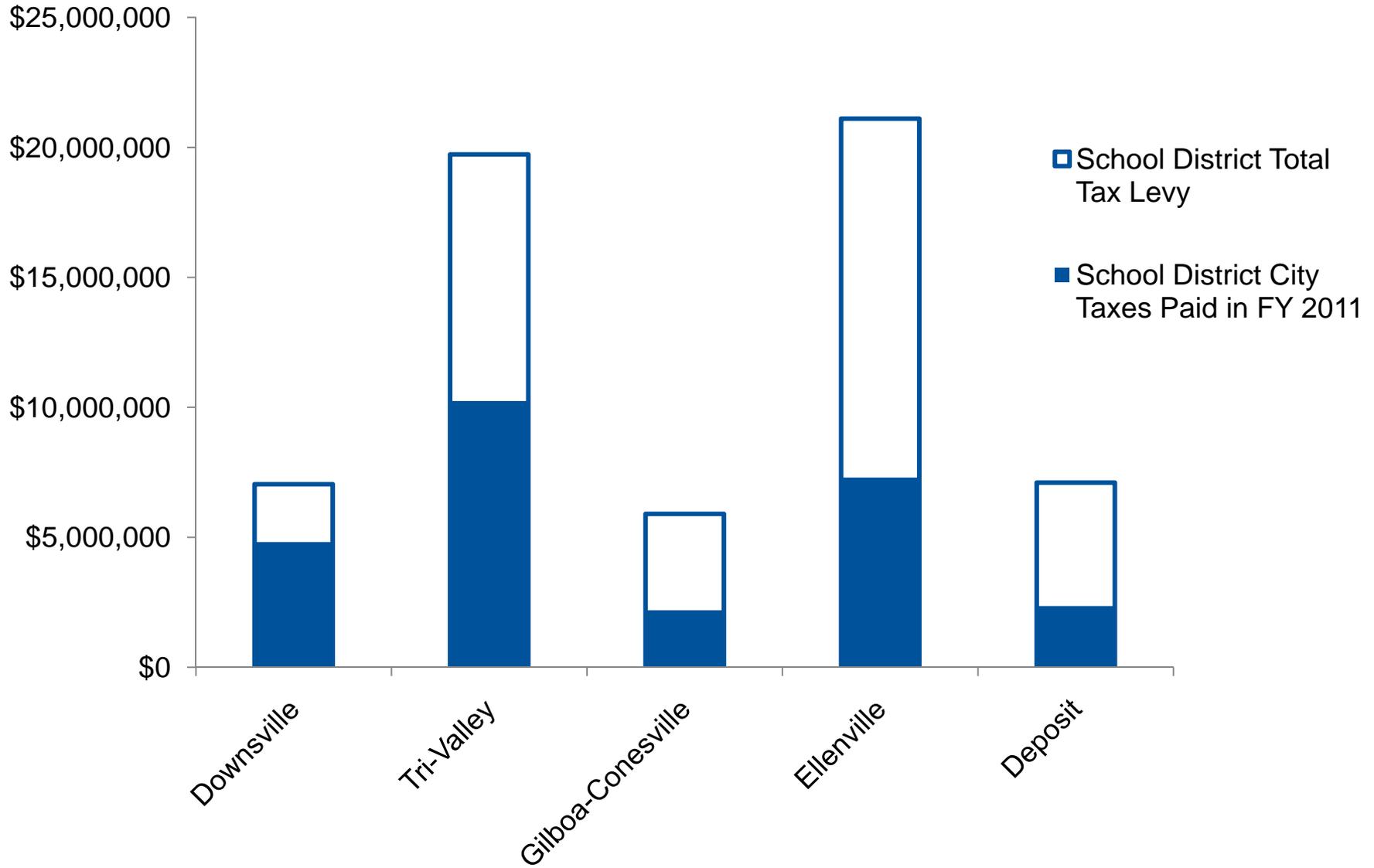


# Retirement Benefits

- In 2011, DEP paid more than \$8.1 million to 267 retirees currently residing in one of the eight watershed counties.

County	Number of Retirees	Value of Pension Payments
Delaware	34	\$928,830
Dutchess	22	\$743,597
Greene	8	\$234,602
Putnam	18	\$866,421
Schoharie	1	\$24,154
Sullivan	38	\$1,029,282
Ulster	64	\$1,580,696
Westchester	82	\$2,773,316
<b>Total</b>	<b>267</b>	<b>\$8,180,900</b>

# DEP Taxes Fund Watershed Schools





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For more information visit [www.nyc.gov/dep](http://www.nyc.gov/dep)

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